Occupational Therapy Assessment of the Upper Limb: Trends in South Africa

by
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DECLARATION

By submitting this dissertation electronically, I declare that the entirety of the work contained therein is my own original work, that I am the sole author thereof (save to the extent explicitly otherwise stated), that reproduction and publication thereof by Stellenbosch University will not infringe any third party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

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ABSTRACT

Introduction: This research was conducted to establish the assessment practices of occupational therapists working with clients with upper limb injuries and/or conditions. This was done to get an updated account of frequency and variation in the use of various assessment tools as well as reasons offered for infrequent use.

Methodology: A quantitative cross-sectional survey design was used. A convenience sample of therapists attending courses was recruited for the study. A questionnaire was developed for the study and face and content validity established through pilot testing. The questionnaire consisted of three sections containing demographic information and questions about upper limb assessment practices. Descriptive statistics were calculated for numerical and categorical data to describe the demographic characteristics and to identify the measurement tools that were used most frequently. The Chi-Square test of associations was used to determine whether there were any associations between frequency of use and demographic factors.

Results: Questionnaires were completed by 81 (71%) respondents. Twenty-two (27.2%) of the respondents had more than five years' experience in the field of hand therapy while the remainder (n=52, 64.2%) had less than five years. The more experienced therapists worked in the private sector (n=49, 60.5%) with two (0.03%) experienced therapists being employed in the public sector. The diagnoses that were seen most commonly were nerve injuries (90.1%), fractures (88.8%) and tendon injuries (85.1%). Of the 81 respondents 15 (18.5%) held post graduate qualifications in the field of hand therapy. Goniometry (68 of 81, 84.0%), manual muscle testing (62 of 81, 76.5%) and testing for flexor digitorum profundus and superficialis function (61 of 81, 76.3%) were used most frequently. Performance tests were used infrequently or not at all. The most common reasons for non-use of performance tests were that they were not available in the practice setting or respondents were not familiar with them. Significant associations were found between frequency of using measurement tools and practice setting, years of experience and holding a post graduate qualification in the field of hand therapy. There was a significant association between working in the private sector and using a dynamometer ($p < 0.001$), and working in government settings and frequent use of the test for localisation ($p = 0.021$). Therapists with more than five years' experience in the field of hand therapy were significantly more likely to use Semmes Weinstein monofilaments ($p = 0.034$) as were those holding a post graduate qualification in hand therapy ($p <0.001$).

Conclusion: The results of this study have serious implications in terms of the upper limb assessment practices of occupational therapists, especially in the context of evidence-based practice which has become crucial not only for the credibility of the profession, but also for its survival. Information obtained through this research could aid to guide education and training at an undergraduate and post graduate level and assist to direct a research focus for hand therapy in the South African context.

OPSOMMING

Inleiding: Hierdie navorsing is uitgevoer om die bepalingspraktyke van arbeidsterapeute wat werk met kliënte met boonste ledemaat beserings en/of toestande vas te stel om sodoende ‘n beeld te verkry van die frekwensie en variasie van die gebruik van bepalingsinstrumente. Redes aangebied vir ongereelde gebruik hiervan is ook ondersoek.

Metode: 'n Kwantitatiewe deursnee-opname-ontwerp is gebruik. ’n Gerieflikheidssteekproef van terapeute wat kursusse bygewoon het, is gewerf vir die studie. ‘n Vraelys is ontwikkel vir die studie, en voorkoms- en inhoudsgeldigheid is bepaal deur ‘n loodstudie. Die vraelys het bestaan uit drie afdelings met demografiese inligting en vrae oor boonste ledemaat bepalingspraktyke. Beskrywende statistiek is bereken vir numeriese en kategoriese data ten einde die demografiese eienskappe te beskryf en die bepalingsmetodes wat die meeste gebruik is, te identifiseer. Die Chi-kwadraat toets is gebruik om te bepaal of daar enige assosiasies tussen die frekwensie van gebruik en demografiese faktore bestaan.

Resultate: Vraelyste is deur 81 (71%) respondente voltooi. Twee-en-twintig (27,2%) van die respondente het meer as vyf jaar ondervinding in die veld van handterapie gehad, terwyl die res (n = 52, 64.2%) minder as vyf jaar gehad het. Die meer ervare terapeute het gewerk in die privaatsektor (n = 49, 60.5%) met twee (0,03%) ervare terapeute in diens van die staat. Senuweebeserings (90.1%), frakture (88,8%) en tendonbeserings (85.1%) was die meeste gesien. Van die 81 respondente het 15 (18,5%) ‘n nagraadse kwalifikasie in die veld van handterapie gehad. Goniometer (68 van 81, 84.0%), spiertoetsing (62 van 81, 76,5%) en die toetse vir fleksor digitorum profundus en superficialis funksie (61 van 81, 76,3%) is die meeste gebruik. Vaardigheidstoetse is selde of glad nie gebruik nie. Die mees algemene redes aangevoer vir die feit dat vaardigheidstoetse nie gebruik is nie, was dat dit óf nie beskikbaar is in die respondent se werksarea nie, óf dat respondente nie vertroud is met die toetse nie. Beduidende assosiasies is gevind tussen die frekwensie van die gebruik van bepalingsmetodes en werksarea, jare ervaring in handterapie en 'n nagraadse kwalifikasie in die veld van die handterapie. Daar was 'n beduidende assosiasie tussen terapeute werksaam in privaatpraktyk en die gebruik van 'n dinamometer ($p < 0,001$) en terapeute werksaam in die staat en gereelde gebruik van die lokalisasie toets ($p = 0.021$). Terapeute met meer as vyf jaar ondervinding, sowel as diegene met ’n nagraadse kwalifikasie in handterapie was beduidend meer geneig om Semmes Weinstein monofilaments te gebruik ($p = 0,034$ en $p < 0,001$ respektiewelik).

Gevolgtrekking : Die bevindinge van hierdie studie het ernstige implikasies in terme van die arbeidsterapie bepalingspraktyke van die boonste ledemaat, veral in die konteks van bewys-gebaseerde praktykvoering (evidence based practice) wat noodsaaklik geword het nie net vir die geloofwaardigheid van die beroep nie, maar ook vir die oorlewing daarvan. Inligting wat verkry is deur middel van hierdie navorsing kan help met onderrig en opleiding op 'n voor-en nagraadse vlak. Dit kan ook help om navorsing in handterapie te rig binne die Suid-Afrikaanse konteks.

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DEDICATIONS

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OPERATIONAL DEFINITION OF TERMS

1. **Upper limb**: For the purpose of this research the upper limb encompasses conditions and / or injuries of the hand and wrist with little reference to the elbow and shoulder, excluding upper motor neuron disorders such as cerebrovascular disorders.
2. **Therapist**: Could refer to physiotherapists and / or occupational therapist or other health care therapists collectively, unless otherwise specified.
3. **Occupational therapist**: Refers to an occupational therapist.
4. **Assessment**: A test or questionnaire used to establish a baseline for treatment and/or an indication of improvement for either a component of function or occupational performance.
5. **Measurement tools**: An umbrella term to include the following assessment types : standardised assessments, non-standardised assessments, outcome measures and informal assessments.
6. **Experiential context**: The context situated through the researchers own experience as well as through informal contact or discussion with colleagues.
7. **HPCSA**: Health Professions Council of South Africa
8. **SASHT**: South African Society of Hand Therapists
9. **OTASA**: Occupational Therapy Association of South Africa
10. **Validity**: Indicates that what needs to be measured is being measured during the administration of the test.
11. **Reliability**: Indicates if a test performs consistently with repeated administration.
12. **Responsiveness (sensitivity)**: The ability of a test to measure changes in an individual.
13. **Standardised assessment**: Tests with known characteristics, uniformity and consistency in test administration and has known levels of validity and reliability
14. **Non standardised assessment**: Tests without known characteristics, uniformity and no consistent way of administration.
15. **Outcome measurement**: standardised assessment for the purpose of evaluation, with proven responsiveness, in order to identify change as a result of intervention.

CHAPTER 1: INTRODUCTION

1.1 Background

Hand therapy is a fast developing speciality within occupational therapy in South Africa as can be seen by the growing number of hand therapy practices, increased membership to the South African Society of Hand Therapists (SASHT) and increased number of postgraduate courses in hand therapy being offered at universities (1). There are a number of occupational therapists exclusively working in this speciality field (2). These therapists work in both the public (government) and the private sectors.

Assessment is an integral and important component of the occupational therapy process, with clinical reasoning as described by Chapparo and Ranka (3) being at the core of this process. Clinical reasoning aims to describe the complexity of therapists' thinking in terms of its diversity and commonalities that influence how they do what they do. According to the Occupational Therapy Practice Framework (4), clinical reasoning is somewhat of a three-pronged approach involving equal measure of the therapist's skills and knowledge, the theoretical principles applied to the specific field or specialty and the available evidence.

During everyday practice, therapists have to carry out assessments of the upper limb in order to plan intervention and monitor progress and outcomes. When assessing the upper limb, the process of clinical reasoning allows the therapist to utilise skills and knowledge and to integrate this with the best available evidence and the theoretical principles applicable to the field of hand therapy. As explained in the Occupational Therapy Practice Framework (4) the goal of the assessment process in occupational therapy is to determine what the client needs to do as well as what the client is able to do. It also seeks to determine the factors that support or hinder (act as barriers to) participation in everyday life (4). Even therapists not working in the field of hand therapy are at times required to carry out assessments of the upper limb for example as part of a work evaluation.

Occupational therapists make use of non-standardised assessments (or informal measurement strategies), standardised assessments or outcome measures when assessing the upper limb. Each of these is used for different reasons. Dunn (5) explains that there may be situations within practice where standardised assessments are inappropriate or not available and under those circumstances the therapist may then make use of more informal (non-standardised) assessments, such as skilled observations or interviews. Law [(6) p. 15] defines measurement as '*a process that involves an assessment, calculation, or judgment of the magnitude, quantity, or quality of a characteristic or attribute.'* According to Corr and

Siddons (7) a measurement tool is standardised if validity, reliability, sensitivity and clinical utility have been established. Dunn (5) advocates that within the profession the process and the outcome of the therapy offered should be measured. Process measurement is used if the therapist wants to know how therapy is progressing; it is often assessed 'in action' and can be a 'very focused' measurement. An outcome measure as explained by Dunn [(5) p. 24] is used when therapists '*wish to know the end result and how this went.'* The impact of services can therefore be evaluated with outcome measures. Outcome measures are in effect also standardised assessments but with the purpose of evaluation (8). Corr and Siddons (7) suggest that in principle, outcome measures and standardised assessments are similar, with the fundamental difference that outcome measures identify the change as a result of the intervention. The different purposes of measurement are explored in the literature review.

For the purpose of this research study, the researcher endeavoured to understand occupational therapy practitioners' use of informal and standardised assessments and outcome measures when assessing the upper limb. The term 'measurement tools' is used as an umbrella term in this dissertation to include all aforementioned assessment types.

1.2 Research problem

There are a number of measurement tools that can be used in the occupational therapy assessment of the upper limb. Measurement is an integral part of the occupational therapy process and a necessity for evidence based practice (9). Without appropriate measurement, therapists cannot provide evidence for interventions offered. The information obtained through standardised assessment also provides reliable data that can assist therapists in justifying occupational therapy services (4). Therapists need to make use of appropriate assessment techniques and document them well to ensure that patients receive the appropriate treatment. As explained by Law et al [(6) p. 2]:

> *'The consistent use of measurement enables occupational therapists to identify the unambiguous outcomes of effective occupational therapy services, thus clarifying the contribution of occupational therapy to the health and well-being of persons needing our services and to others on the healthcare team.'*

An extensive search of South African literature was done to identify studies that investigated the use of measurement tools during occupational therapy assessment of the upper limb. Google Scholar, Sabinet and Africa-Wide were searched from 2000 to 2013 using the keywords 'occupational therapy assessment', 'standardised assessment', 'outcome

measure', 'measurement instrument', 'measurement tool', 'upper limb', 'upper extremity' and 'hand therapy'. No South African studies were found but one study conducted in Nigeria was located. This descriptive study conducted with Nigerian physiotherapists (10) surveyed knowledge of 16 standardised outcome measures. Sixty percent (N=236) of the respondents never used standardised outcome measures and were not familiar with 14 of the 16 assessments listed in the questionnaire. The authors expressed concern about the lack of the therapists' familiarity with outcome measures and suggested that this indicated reduced levels of assessment with the use of outcome measures with subsequent inadequate uptake of evidence based practice (8).

Should this trend also apply in South Africa, the implications will be equally alarming. There is a clear drive towards evidence based practice in our settings which will be further explored in the rationale for this study and the literature review. The use of appropriate assessment methods enables therapists to demonstrate the effects of their intervention thus creating evidence for practice.

Experiential context:

In the South African context therapists generally do have access to standardised measurement tools. Despite the availability of a number of outcome measures in this context, some of which have even been translated to Afrikaans and Xhosa (11), the researcher has observed that therapists do not use measurement tools routinely in daily practice with clients with upper limb injuries. The researcher has also encountered therapists who choose to use informal measurement tools rather than standardised measurement tools in assessing clients with upper limb injuries. Some possible reasons for this state of affairs include: lack of knowledge about appropriate measurement tools; lack of training and education in the use of appropriate measurement tools; lack of resources in terms of measurement tools needed, time constraints due to high therapist/client ratios; disregard for the importance of appropriate assessment and the inability to make appropriate choices in deciding which tool to use. However, no research has been done to investigate the use of measurement tools in the assessment of the upper limb or the reasons why therapists don't use measurement tools. Therefore, the researcher set out to firstly establish the trends in assessment practices of the upper limb, and secondly to determine the reasons offered by therapists for not using measurement tools routinely in their practice.

1.3 Research Question

What are the assessment practices of occupational therapists working with clients with upper limb injuries and/or conditions in South Africa?

1.4 Aim of the study

The aim of this research study was to provide an updated account of the measurement tools used by South African occupational therapists in the assessment of the upper limb to determine assessment practices with regards to frequency of use and reasons for not using measurement tools.

1.5 Rationale

Dunn (5) suggests that there are two primary reasons why measurement is needed in practice. Firstly, measurement provides evidence of the client's difficulties or problems which is needed to plan and document effective intervention. A second reason is that appropriate measurement ensures client-centeredness through involvement of the individual and possibly their family in the decision making about appropriate intervention. The implications for failure to use appropriate measurement tools in daily practice are therefore far reaching. According to Dunn (5) measurement is essential for evidence based practice. Van Niekerk (12) explains that in the environments - increasingly driven by legislation - in which occupational therapists practice within South Africa, there is an increased mandate to produce evidence of the services (interventions) offered. Outcomes of services have to be validated (12). This point is further echoed in the Western Cape Department of Health Healthcare 2030 plan (13) that states that there will be an increased move towards outcome based intervention and that priority will be given to intervention that works toward the desirable outcomes (13). If therapists do not assess, they will not be able to provide evidence for the interventions offered and therefore face the risk of not receiving funding for services.

The researcher anticipates a lack of use of measurement tools in the occupational therapy assessment of the upper limb; however, no research has yet been done to establish what therapists use. Information about the type of measurement tools used frequently in this field can be used to inform the content of education programmes at an undergraduate and post graduate level. If indeed there is infrequent use of the appropriate measurement tools in this field, information gathered from this research study may assist in changing occupational therapy practice in the field of hand therapy.

The information gathered by this research study will ensure that appropriate education is offered by a body such as SASHT. Cook, McCluskey and Bowman (14) reported an increased use of outcome measures among Australian occupational therapists working in stroke rehabilitation following participation in an education programme. A logical assumption that emanates from this finding is that if education is offered in the use of outcome measures, their use among therapists will improve. The researcher is involved in undergraduate as well as postgraduate training in the field of hand therapy; therefore the findings will inform everyday teaching and curriculum planning at Stellenbosch University and other higher education institutions offering occupational therapy training.

1.6 Objectives

1. To describe the demographic characteristics of therapists included in the study.
2. To determine which measurement tools occupational therapists use for assessing the upper limb.
3. To establish the frequency with which each measurement tool is used.
4. To describe the factors influencing the frequency of use of the measurement tools.
5. To determine the characteristics of therapists who use measurement tools frequently as well as those who use them infrequently by establishing whether associations exist between variables.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

In the literature review the researcher will explore assessment as part of clinical practice and give an overview of the trends in other countries with regards to the use of standardised assessment and/or outcome measures by occupational therapists in daily practice. The literature review also explores the purpose of assessment of the upper limb as well as best practice in upper limb assessment. The researcher will consider what should be assessed in relation to a specific diagnosis with due consideration of the stage of healing, as well as what is available within the South African context.

2.2 Assessment as Part of Clinical Practice

Popham (15) defined measurement as the rules we follow in order to quantify a classification of certain attributes or characteristics our clients possess. The importance of measurement in occupational therapy has been widely documented (6,9). Measurement assists therapists to establish a baseline for treatment, track progress and motivate for treatment or services rendered to a specific client. It also ensures that treatment is client-centred (9). Client-centeredness has been defined by Law, Baptiste and Mills [(16) p. 253] as: '*an approach to service which embraces a philosophy of respect for, and partnership with, people receiving services*'. A client-centred approach has to be applied to measurement as well. This is achieved through '*careful understanding*' of the individual before the onset of occupational therapy intervention [(16) p. 253]. Law and Baum (6) continue to explain that this type of approach ensures that the client is engaged in the occupational therapy process and is also likely to lead to increased cooperation by the client. In this approach the client and therapist work together to establish the occupational performance problems and to set goals for the required intervention. Measurement has to take place in order for this to be possible. Assessment tools are employed at this point to establish those factors that support or hinder the client's occupational performance (4). These tools must have the ability to detect the significant changes over time through observation and measurement of occupational performance (4,6,17). This research and others strongly advocate the necessity for standardised assessment in Occupational therapy (4-7). In a study based in the United Kingdom the authors investigated the uptake of standardised assessments in rheumatology (18). One of the groups of respondents indicated that they made little use of standardised assessments, due to a lack of knowledge about what is available as well as due to lack of appropriate training in the use of available assessments (18). They did however

acknowledge the importance of the use of standardised assessments rather than informal assessments in striving towards more evidence-based practice.

2.3 Assessment Trends in Developed Countries

Extensive research into the use of measurement tools has been done in Australia, Ireland, England, United States of America and Canada (7,14,18-25). These studies did not only pertain to hand therapy or assessment of the upper limb and investigated assessment practices of not only occupational therapists but of other health care workers as well. Some of these studies will be discussed below.

In an Australian study conducted in 2006, Bowman (20) explored the process and the challenges that form part of the decision-making process when selecting outcome measures in order to measure the effect of intervention. This was a qualitative focus group study that included ten occupational therapists working with stroke patients. Bowman found that the therapists almost exclusively focused on '*the challenges and barriers to measuring outcomes*' [(13) p. 565]. Some of those challenges and barriers were reported to be a lack of knowledge and skill in outcome measures as well as a lack of assistance to the therapists in terms of resources (20).

Skinner and Turner-Stokes (23) undertook a cross-sectional survey in rehabilitation centres in the United Kingdom in order to establish which standardised outcome measures are used in everyday practice. The 180 questionnaires were sent via post to the respondents who were all members of the British Society of Rehabilitation Medicine (BSRM) and a 60% response rate was obtained. The centres at which the study was conducted were mostly physical rehabilitation centres. This research study had the most positive report on the use of outcome measures found in the literature to date with 86% stating that they used some kind of standardised outcome measure as part of daily clinical practice (23). The outcome of this study was an updated BSRM list of recommended standardised outcome measures for use in rehabilitation centres in the United Kingdom.

Brangan and O'Neill (21) conducted a study amongst a sample of 50 Irish occupational therapists in 1998 and found that standardised measurement tools were the least commonly used method to assess components and occupational performance. In 1992, Shanahan (19) conducted research on the same topic in Ireland and made use of a postal survey with a sample of 143 therapists. In that study it was found that therapists relied mostly on subjective assessment such as interview and observation, rather than standardised measurement tools. In Shanahan's study, the use of standardised assessment was very low in the physical

medicine field, with a total percentage of 18.6% of the sample group reported to use standardised measurement tools (19).

Stapleton and McBrearty (25) wanted to update the information obtained through Shanahan's research and investigated the usage of standardised measurement tools by occupational therapists in 2007. Their study was also conducted in Ireland and focused on occupational therapists working with people with physical disabilities. They recognised that the consistent use of standardised measurement tools is essential in order to develop and establish evidence based practice. From the studies above it was concluded that therapists in Ireland used non-standardised assessments developed and used only within specific occupational therapy departments (19,21,25). The respondents in these studies reported the main reasons for this phenomenon to be a potential lack of knowledge of the appropriate tool, lack of sensitivity of measurement tools and lack of time in the clinical setting (21,25).

The above study findings highlight that the problem identified by Akinpelu and Eluchie (10) in their Nigerian study also exists in other countries. These findings illustrate that although therapists acknowledge the importance of standardised or more formal assessments, they continue to rely more on subjective assessments.

2.4 The Purpose of Assessment

Kirshner and Guyatt (8) divided health status measurement into three broad categories. They stated that health measurements have the purpose of discrimination, prediction or evaluation. Each of these will be explored below.

2.4.1 Discriminative Value

A test used for the purpose of discrimination '*is used to distinguish between individuals or groups on an underlying dimension when no external criterion or gold standard is available*'. [(8) p. 27]. Law (9) explains that a test used for its discriminative value can be used to compare a particular stroke patient to other stroke patients. A discriminative hand assessment tool should include characteristics that discriminate between individuals for example: range of motion and muscle strength (9).

In a study by Marx, Bombardie and Wright (26) the authors investigated the reliability and validity of physical examination test used in the assessment of the upper limb. They focussed on tests used by surgeons to add information in order to make an effective diagnosis. They state that the physical examination that includes the use of a particular measurement tool is used to '*grade the level of impairment and to make a diagnosis*' [(26) p. 190]. Some of the

measurement tools investigated in this study that are appropriate for hand and upper limb assessment are: range of motion measurement, manual muscle testing, dynametric muscle testing, Phalen's test, Tinel's sign and two point discrimination. These tests hold discriminative value and are therefore able to discriminate between individuals as well as assist to make a diagnosis (26).

2.4.2 Predictive Value

Predictive measures are used to predict health status outcomes within a population. These are tests where a gold standard therefore exists. According to Law (9) these tests can be used to identify the probability of full recovery. These tests are mainly used in a screening process, to measure a specific attribute (for example activity of daily living (ADL) functioning) in order to predict the probability of the individual returning to previous ADL functions (9). The researcher could not obtain any specific examples of tests with predictive value used in the field of hand therapy. Efforts have however been made towards refining the McGill pain questionnaire, a tool that can be used to assess pain in the hand injured patient, to have greater predictive value (27).

2.4.3 Evaluative Value

If the occupational therapist would like to evaluate the outcome or the benefit of the treatment or intervention, an evaluation measure is used. These instruments are referred to as outcome measures. An instrument used for evaluation will contain items or criteria which can measure change over time. It measures if there is change following an occupational therapy programme. MacDermid (28) proposes that the change in health status can be as a result of the treatment, the specific disease or due to time. She also differs from the opinion of Law (9) about the suitability of range of motion measurement for discriminative purposes. She uses an example of the use of active range of motion to evaluate the change in tendon glide over time and therefore proposes that it can be used as an outcome measure (28).

Conflicting opinions exist about the evaluative value of measurement tools in the assessment of the upper limb (9,17,28-32). These conflicting views are discussed below. However, there is consensus about the following tools and their use as outcome measures in hand therapy practice: The Disability of the Arm, Shoulder and Hand Questionnaire (DASH) (11), the Shape Texture Identification test (STI Test) (33), the Moberg Pick Up Test (34,35) and Semmes Weinstein Monofilaments (SWMF) (36).

2.5 What should be measured during the Assessment Process?

During this section of the literature review the researcher explored the measurement of activity and participation as well as how performance tests and questionnaires can be utilised towards evaluating outcome.

2.5.1 Activity and Participation

The development of the International Classification of Functioning, Disability and Health (ICF) in the early 1980's by the World Health Organisation changed the way outcomes are measured (28). After development of this model, it was no longer acceptable to focus only on health outcomes following surgical, medical of therapy interventions. MacDermid (28) states that the advances in the measurement of outcomes allow us to understand the results of treatment in a broader sense. It allows us to understand the impact it might have on functioning, disability and health. MacDermid (28) also argues that despite the value hand therapy adds through improving physical impairment (i.e. range of motion or muscle strength) and assisting an individual to improve health and function by addressing residual problems, hand therapy typically focuses on the physical impairments as the primary measure of outcome in the evaluation of the effect of treatment. Van de Ven – Stevens, Munneke, Terwee, Spauwen and van der Linde (37) discuss the necessity for hand assessments to not only reflect on the symptom but also on the patient's ability to perform their occupations, in a systematic review of the clinimetric properties of instruments that assess activities in patients with hand injury. They make a strong argument that such tests are necessary in order to make decisions about interventions, track patient progress and to evaluate the effectiveness of the intervention offered (37). Powell and Wietlisbach also advocate for measurement to not only report on the symptom and state:

> '*The gold standard of evidence-based practice is the growing push for higher quality evidence, which goes beyond simple objective measurements and reflects an individual's ability to participate in life*' [(38) p. 237]

In a study by Gummesson, Artoshi and Ekdahl (39) the authors investigated the type of outcome measures used in randomised controlled trials (RCT's) that are related to the treatment of upper limb injuries. RCT's are recognised as an important way in which to establish effectiveness of intervention. The authors were interested in establishing whether outcome measures used in the RCT's under investigation, measure body function and structure as per the ICF definition or whether the outcomes measures used also report on

activities and participation (39). In their research they found a limited number of studies that used outcome measures that report on activity and participation (39).

2.5.2 Performance tests and Questionnaires

Schoneveld, Wittink and Takken (17) undertook a systematic review of the clinimetric properties of measurement tools that are used in the assessment of the upper limb, specifically those which assesses activity and participation. They focussed on the clinimetric properties of both questionnaires and performance tests used to assess the upper limb. A performance test can be defined as a test or assessment tool, where the patient has to 'do' something in order for the therapist to make observations, for example, the type of grip used during the execution of the Sollerman test of Hand Function. The 'doing' can also be timed and scored against a set of norms as would happen during the execution of the Sollerman test of hand function (40), the Smith Hand function evaluation (41), the Jebsen test of Hand function (42) or the Nine hole peg test (43). The performance test can also be used to measure progress in terms of time it took to complete the task as in the case of the Moberg pick up test (34,35) or the Nine hole peg test (43). Schoneveld et al (17) identified 15 measurement tools that measured at the level of activity and participation. They employed a set of criteria against which they assessed the quality of the five questionnaires and the ten performance tests that were included in the review (17). The set of criteria measured - amongst other aspects - properties such as validity, reliability and responsiveness. Their systematic review concluded that the clinimetric properties of the measurement tools included in their study were poor, specifically for the performance tests (17). As far as the questionnaires were concerned, the DASH (11) has well established validity, reliability and responsiveness and can therefore readily be used as an outcome measure (17).

2.6 Criteria to Consider for Clinical Utility of Measurement Tools

Law (9) published an algorithm to aid the therapist in evaluating a specific measurement tool to first establish its clinical utility, whether it is standardised and lastly, to evaluate the purpose of the instrument. In the algorithm she proposes that an instrument that is to be used for the purpose of evaluation (an outcome measure) should be responsive, have test – retest and observer reliability, and content and construct validity (9).

Jerosch-Herold (44) emphasises the importance of outcome measures in hand therapy. She similarly advocated for considering pragmatic factors, including the portability of the test, its cost, acceptability and ease of use, along with the psychometric properties of validity, reliability and responsiveness (44). In an attempt to assist researchers and clinicians to

choose an appropriate outcome measure she devised a structured checklist to critically appraise studies on outcome measures. The purpose of the checklist is to assist in the evaluation of those psychometric properties that are important in outcome measurement (44).

Jerosh-Herold stated that: '*Use of outcome measures which are highly responsive allows fewer patients to be studied when investigating the effectiveness of surgical or*

therapeutic interventions.' [(44) p. 258] This could have relevance in the South African context as follow-up often proves difficult, thus using responsive tools could yield evidence from studying fever patients that are followed-up for the duration of their injury or condition.

2.7 Measurement Related to Specific Performance Components or Injury

MacDermid states that measurement of the physical impairments that derives from a nerve or a tendon injury to the hand, has been the primary focus of evaluating the outcome of the surgery or the therapy following such an injury (31). The primary result following injury to either a nerve or a tendon would be loss of range of motion, strength and sensibility (31).

Impairment in muscle strength can either be assessed with Manual Muscle Testing (MMT) or with dynamometry. The procedure for the correct execution MMT is described well in the literature (45-47). Authors have however concluded that once a muscle is innervated to a Grade 3 on the Oxford Scale one has to start employing a dynamometer in order to ensure that further improvement is monitored sufficiently (47).

Grip strength measurement by means of dynamometers has been studied extensively and reliability has been proven (48,49). Its use in the assessment of strength following either a tendon or a nerve injury is not contested. MacDermid (31) does however emphasise two key elements to ensure accurate measurement by means of a dynamometer: 1) regular calibration of the instrument and 2) a standardised procedure to the execution of the assessment.

Van de Pol, van Trijffel and Lucas (50) conducted a systematic review in order to establish if inter-rated reliability in the assessment of range of motion in the upper limb is better if instruments are used in the assessment. They distinguished between the use of vision and employing a tool such as a goniometer or an inclinometer (50). Their study concluded that measurement with the use of a goniometer is more reliable than using vision. In the introduction to their article, they refer to range of motion measurement as having

discriminative value which supports Law's view on the purpose for which we measure range of motion (9,50).

In their research Stegink, Jansen and Watson (51) argue that range of motion measurement in itself is not sufficient way to report on outcome following tendon repair. They state that other measures should also be employed such as measures that report on the function or performance of the individual, and relating the lack of range of motion of the finger to the individual's performance of his or her occupations (51).

Sensibility measurement range from threshold testing (i.e. touch or temperature), to tactile discrimination (i.e. two point discrimination) to proprioception. From the literature it is clear that touch threshold is best tested with SWMF (36). The validity, reliability and responsiveness of the SWMF were confirmed by Rosén and Lundborg in 2000 (36). Variations of this test exist. There are the original SWMF, the Weinstein Enhanced Sensory Test (WEST) and the Adaptation of the SWMT from Brazil (The Sorri – Bauru Model S-W Monofilaments) (52). In the experience of the researcher, the latter is the one used most frequently in the South African context due to it being less expensive and as the authors suggested, 'a *model more practical for health programs in other developing countries'* [(52) p. 295].

Tactile discrimination is most commonly assessed by means of measuring two-point discrimination (2PD). Jerosch-Herold (29) has however shown that 2PD is not sufficiently responsive and can therefore not be used as an outcome measure for sensibility. In the literature 2PD has been shown to be associated with the ability to discriminate between object and function (53). MacDermid suggests that 2PD should therefore be considered as an instrument for the purpose of discrimination and not evaluation (28). The Shape Texture Identification test by Rosén and Lundborg is a good alternative to traditional tactile gnosis testing (36). Jerosch-Herold also indicated that the Moberg Pick up test (34,35) has good responsiveness as it showed good sensitivity to change in a study of responsiveness of five sensibility test of recovery after median nerve injury and repair (29).

MacDermid (32) investigated the responsiveness of a number of measurement tools used to evaluate the outcome following a distal radius fracture. The tools that were studied included the Short Form 36, The Disability of the Arm, Shoulder and Hand Questionnaire (DASH), the Patient Rated Wrist Evaluation (PRWE), static grip strength by means of a dynamometer, range of motion by means of a goniometer and dexterity by completing subtests of the Jebsen Test of Hand Function (32). In this study the author concluded that out of the three questionnaires the DASH was overall the most responsive for evaluating outcome following a

distal radius fracture. She describes that the fact that a patient can complete a questionnaire before a therapist can conduct physical performance assessments (such as range of motion or grip strength in the early stages of fracture healing) offers the therapist vital information about the patients' status prior to assessing the physical performance components (32). In this study the physical performance component assessments were found to be more responsive in the three to six month follow – up assessment as compared to the Short Form 36, The DASH or the PRWE (32). Assessment of grip strength and range of motion was found to be responsive. The author does however reiterate that neither should be used in isolation as the physical performance measures lacks information on what is priority for the patient and in turn, just assessing through a questionnaire is not a true measure of overall outcome (32).

Hanson, Neidenbach, de Boer and Stengel (54) investigated the functional outcomes following proximal humeral fractures. They also made use of the DASH as well as (muscle) power measurements and range of motion in order to report their results. In an older study by Duncan, Freeland and Meydrech (55) the authors conducted an analysis of recovery of active motion following hand fractures. These authors made use of range of motion measurement by means of a goniometer in order to report their results, as did Ip, Ng and Show (56) in their prospective study of 924 digital fractures. It is clear from the literature that a therapist should at least measure range of motion in the case of fracture to the upper limb, but that in order to evaluate outcome of treatment, additional measurement is required (32,54-56).

In their systematic review Van de Ven-Stevens et al (37) considered instruments that measured participation in activity. Their list of measurement tools included performance tests and questionnaires. They searched and reviewed the literature in order to establish if the measurement tools displayed properties (amongst others) of validity, reliability and responsiveness (37). Many of the measurement tools included in their study did show to have validity, reliability and responsiveness which according to Law (9) and Jerosch-Herold (44) would allow for it to be used as an outcome measure.

2.8 Summary

The literature has shown that the use of standardised assessment and outcome measurement by occupational therapists in other countries around the world is low. Through published research findings the researcher attempted to highlight the purpose of assessment as well as what should be assessed. The research findings further demonstrate that appropriate tools exist, that they can be appraised against a set of criteria and that different

tools are indicated for different diagnosis or stages of healing. Conflicting opinions exist about discriminative or evaluative value of measurement tools. There is also a lack of research about assessment practices in the developing context where resources are scares, follow-up is poor and therapists have high workloads.

CHAPTER 3: METHODOLOGY

3.1 Introduction

The basis for this research was laid in the previous chapter through discussing the literature relevant to the research question. This chapter deals with the research methodology that was used in this study. The study design, study population and sampling are discussed first. The design and pilot testing of the instrument is discussed before describing the data collection and data analysis strategies.

3.2 Study Design

The objectives of this research study were best achieved with a positivist approach through a quantitative non-experimental research design. A cross-sectional survey was used as this assisted the researcher to generalise information obtained from the sample to the population of occupational therapists in assessing the upper limb in South Africa (57). In a positivist paradigm knowledge may be created through conducting surveys (58). Through this design information was gathered at a single point in time (57). The design was applied with the aim of providing a profile of the current use of occupational therapy measurement tools in the assessment of the upper limb. Babbie (57) explains that a survey can assist a researcher to understand that a certain trait or attribute exists in a population (For example: occupational therapists frequently use manual muscle testing to assess muscle strength in the upper limb), but it will not assist the researcher to understand why the trait or attribute exists in the population.

3.3 Study Population

The population that were studied during this research were occupational therapists in South Africa working in the field of hand therapy or therapy for the upper limb. The South African Society of Hand Therapists (SASHT) had a total of 131 occupational therapist members in 2012 (1) and 243 therapists indicated hand therapy as a specialisation in their Occupational Therapy Association of South Africa (OTASA) membership information in 2013 (2). As SASHT members could also be OTASA members, there is uncertainty as to the exact number of occupational therapists working in this field. There are most likely also therapists practicing within this field who are not members of either association.

In the South African context, hand therapy is practiced in the public and private sectors. Specialised hand clinics in both these sectors employ therapists that work exclusively in the field of hand therapy. There are also a number of occupational therapists in the private and public sectors that treat individuals with hand or upper limb disorders amongst a number of other diseases and injuries. This study aimed to include any occupational therapist working in this field, whether exclusively or otherwise.

3.4 Sampling

A convenience sample was selected from therapists attending courses for continuing professional development and those enrolled for a post graduate qualification in hand therapy. It was assumed that this group was representative of the population of occupational therapists working in the field of hand therapy. All course respondents that agreed to participate in the study were included in the sample. The researcher is a member of the South African Society of Hand Therapists (SASHT) as well as the Occupational Therapy Association of South Africa (OTASA) and therefor receives regular information about upcoming courses and events (i.e. the Occupational therapy in Occupational Therapy interest group launch and events). The researcher holds a Post Graduate Diploma in Hand Therapy from the University of Pretoria and as a result knows the course convenor as well as the outline of the course work weeks.

The following groups were targeted for inclusion in the sample:

- All occupational therapy course participants of the South African Society of Hand Therapists (SASHT) courses that were conducted during the period of data collection (March 2013 to May 2013) in Cape Town and Johannesburg. The researcher intended to collect data from a SASHT course scheduled in Durban, but the course was cancelled by the organisers at the last minute.
- All occupational therapists enrolled for the Post graduate Diploma in Hand therapy at the University of Pretoria, during their block week (15 – 19 April 2013).
- All occupational therapy course participants from the Occupational Therapy in Occupational Health (OTOH) interest group course presented in Cape Town on 19 April 2013. These were therapists that do not work in the field of hand therapy but who are required to assess the upper limb as part of medico legal assessments or functional capacity evaluations.
- The researcher also contacted occupational therapists in Worcester, Kimberley, Port Elizabeth and Durban for distribution of the questionnaire to their occupational therapy

colleagues, in both private and government settings, treating patients with conditions of the upper limb.

There were 114 therapists involved in the events listed above.

3.4.1 Inclusion and Exclusion Criteria:

All respondents who met the following inclusion criteria were included in the final sample:

- Qualified Occupational therapists, registered with the Health Professions Council of South Africa.
- Working in the field of upper limb injuries/conditions/disability in the public (government) or private sector in South Africa.

There were no exclusion criteria.

3.5 Instrumentation

Data were collected using a self-administered questionnaire developed for the purpose of the research (see Appendix 1).

The survey comprised of three sections as in the study by Stapleton and McBrearty (25). The first section of the questionnaire contains demographic information in order to establish a demographic profile of the respondents. The second section of the questionnaire contained a list of 44 measurement tools and respondents had to indicate on a five point Likert scale the frequency with which the tools are used. Stapleton and McBrearty (25) designed their questionnaire to contain both quantitative and qualitative information. The researcher did not include the general qualitative questions Stapleton and McBrearty included in their questionnaire. Instead, in order to achieve the objectives of this study a section was included to gather data on possible reasons for not using measurement tools with frequency. The third section therefore explored the possible factors impacting on the frequency of use of the measurement tool. The questionnaire included closed questions as they require less time to complete, are easy to analyse and provide specific information (59). The researcher did however provide an option in the questionnaire where the respondents could specify or add ‘other’. The ‘other’ option, with space to add text, in both sections two and three allowed the participant to add information on additional measurement tools (section two) or factors (section three) not included in the final questionnaire. In doing this, bias was reduced as respondents could add information they found relevant. Table 3.1 shows the different sections of the questionnaire (See Appendix 1 for the questionnaire).

Table 3.1: Sections of the Questionnaire

Section 1	Demographic information: • Years of practice • Years of practice in the field of hand therapy • Practice setting (public or private) • Institution through which respondents received their degrees/diplomas in Occupational therapy • Post graduate qualifications in the field of hand therapy (this included a Post graduate Diploma in Hand Therapy, Masters in Hand Therapy or the American 'Certified Hand Therapist' qualification) • Other Post graduate Qualifications (this included but were not restricted to a Post graduate Diploma in Vocational Rehabilitation, Master's degree and other.) • Diagnostic groupings making up the respondents typical caseload
Section 2	• An attempt was made to compile an inclusive list of informal assessments, standardised assessments and outcome measures based on an extensive review of literature, personal experience and anecdotal evidence from therapists in the South African context. In order to allow respondents to add to this list, an 'other' category was added. • Respondents indicated on a five point Likert scale, the frequency with which these assessments are being used. The categories were: 1: Not used at all, 2: Seldom, 3: Sometimes, 4: Frequently, 5: Very Frequently
Section 3	In this section the respondents were required to indicate the factors impacting on the frequency of use of the measurement tools. These factors were derived from examples in the literature (25) and included the following: • The measurement tool is not available in my practice setting. • I did not receive training in the use of the measurement tool. • Due to monetary constraints the assessments cannot be purchased. • Time constraints in my practice setting do not allow me to use the assessment. • The measurement tool is not applicable to diagnostic groupings treated in my practice setting. • An 'other reason (please specify)' item with space to add text was also included where other reasons were listed. These reasons are also reported on in Chapter 4.

Although the researcher undertook to translate the completed questionnaire into Afrikaans in the original research proposal, a decision was later made not to do this for the following reasons:

1. It was assumed that all therapists working in South Africa and registered with the Health Profession Council of South Africa would be proficient in English.
2. Therapists working with measurement tools are familiar with the names which are in English and are not easily translatable.
3. The courses and/or lectures where data collection took place were offered in English.
4. To ensure that this would not exclude potential respondents, they were informed that if they preferred an Afrikaans version, the questionnaire would be translated and made available to them at a later date.

3.6 Pilot Testing of the Questionnaire

The purpose of pilot testing the questionnaire was to identify problems or ambiguities in items and overall structure and to establish reliability and validity of the newly developed instrument. Stapleton and McBrearty (25) reported that piloting the initial draft of their questionnaire on six occupational therapists ensured an element of face and content validity of the final questionnaire.

An initial draft of the questionnaire was piloted by asking six occupational therapists to complete the questionnaire. These therapists provided feedback based on whether the questionnaire was in line with the aims of the study to ensure content and face validity. Test-retest reliability was established during the pilot testing by administering the questionnaire to the therapists involved in the pilot study and repeating the measure within a short time period (within 30 minutes). Content validity was established by presenting the questionnaire to three therapists to determine whether the proposed sections in the questionnaire measured what they were intended to measure (60). The three therapists were chosen to represent therapists working in the public sector (government) the private sector and therapists having to carry out assessments of the upper limb for medico legal purposes. These therapists also gave their opinion on the appearance of the questionnaire for the purpose of ensuring its face validity (61).

The questionnaire was given to the three occupational therapists (OT's) from different practice settings to review (see Table 3.2).

Table 3.2: Therapists involved in pilot testing

	Practice setting
Occupational Therapist I	Public sector (Government hospital), working in the field of hand therapy
Occupational Therapist II	Private sector (Private practice), working in the field of hand therapy
Occupational Therapist III	Public or private sector, not working exclusively in the field of hand therapy but is required to carry out assessment of the upper limb for example for the purpose of a work evaluation.

All three therapists had more than 15 years' experience in their respective fields and were known to the researcher prior to selection and were selected based on a professional relationship with the researcher and their known qualities of professionalism and knowledge in their respective practice domains. They were also chosen for logistical reasons, as all live in Cape Town so a face-to-face interview could be arranged if necessary. The therapists were required to complete the questionnaire and comment on the clarity of the questions and whether they were in line with the aim of the study. According to Oppenheim '*content validity seeks to establish that the items or questions (in the questionnaire) are a well-balanced sample of the content domain to be measured.'* [(59) p. 162]. Through field testing in this way, the therapists were therefore required to determine whether:

- the list of measurement tools that were included were inclusive of all possible tools.
- the frequency with which occupational therapists use the measurement tools in the assessment of the upper limb was tested in the questionnaire
- an option about alternative measurement tools used was asked in the questionnaire ('other' with space for text)
- the list of factors impacting on frequency of use of the measurement tools was representative and inclusive of all possible reasons that may be put forward
- an option about alternative factors impacting on the frequency of use of the measurement tools was asked in the questionnaire ('other' with space for text)
- the clinical utility, e.g. how long does it take to complete
- face validity, i.e. were questions clear, was the correct terminology used, was the instruction for completion clear

The request for participation in the pilot study was sent to the therapists via email. Once they indicated that they were willing to participate, the research proposal (with clear outlines of the reasons and purpose of piloting the survey) and the survey was sent to them via email.

Feedback was obtained from the pilot study respondents. Telephonic interviews were conducted with Occupational therapist I and II and an appointment was made with Occupational therapist III to meet for the interview. Detail on the feedback is shown in Appendix 2.

The feedback was used to make amendments to the questionnaire. All the feedback was implemented, apart from the comment from OT I regarding the inclusion of diagnostic tests (see Appendix 2). The reasons the researcher decided to include these tests was to establish whether therapists used diagnostic tools more frequently than performance or functional tests (11). The results of the frequency of use can be seen in Chapter 4.

3.7 Procedure for Data Collection

The period of data collection was March 2013 to May 2013. The questionnaires were distributed to therapists included in the sample as explained above (Section 3.4 Sampling). Attendees of the South African Society of Hand Therapists (SASHT) workshops in the Western Cape and Gauteng as well as students enrolled for the Post Graduate Diploma in Hand Therapy at the University of Pretoria were approached. Course attendees of an Occupational Therapy in Occupational Health (OTOH) interest group course in Cape Town were also approached. As there were no courses offered by SASHT in KwaZulu-Natal during the period of data collection, the researcher contacted occupational therapy colleagues in Durban for distribution of the questionnaire to their occupational therapy colleagues, in both private and government settings, treating patients with conditions of the upper limb. The same was done in Worcester, Kimberley and Port Elizabeth to ensure a representative sample from all main centres in South Africa. All questionnaires were accompanied by an information leaflet and consent form (See Appendix 3).

The information leaflet was presented to the potential participant and they were required to complete the consent form prior to completing the questionnaire. They were informed that the information they offered on the questionnaire is confidential and that confidentiality would be maintained throughout the process. In the Western Cape the researcher personally handed out the questionnaire to course respondents at the SASHT and OTOH workshops and collected it on the same occasion. In Gauteng the researcher requested the assistance of the regional committee chairpersons of SASHT and a colleague to administer the questionnaire on behalf of the researcher. For the Post Graduate Diplomas in Hand Therapy students at the University of Pretoria, the researcher requested the assistance of the course convenor and a colleague. Colleagues were approached for the other venues as well. All were instructed to offer a brief explanation about the research; to ask if any of the

respondents would prefer an Afrikaans questionnaire; and then finally to ensure that all the consent forms were signed and questionnaires returned after completion.

The necessary permission was obtained from the individuals involved and it was put forward that it should not take more than 15 minutes to complete, should be completed in the same venue in which they find themselves and will be collected before the end of the course or the contact session. No incentives were offered for participation. The instructions to all involved in distributing the questionnaire were the same, as outlined above.

Table 3.3: Procedure for Data Collection

Potential Respondents	Population	Venue	Person responsible for disseminating and collecting questionnaires	Method of return
SASHT and OTOH workshops attendees	55	Western Cape (Cape Town)	Researcher	Collected at workshops by researcher
SASHT workshop attendees	17	Gauteng (Johannesburg)	Regional SASHT committee chairperson and colleague	Couriered to researcher
Diploma in Hand Therapy enrolled students, University of Pretoria	28	Gauteng (Pretoria)	Course convener of programme and colleague	Couriered to researcher
Occupational therapists	2	Durban	Colleagues in Durban were approached by the researcher	Questionnaires were scanned and sent to the researcher via email
Occupational therapists	6	Kimberley	A colleague working in Kimberley distributed the questionnaires	Couriered to researcher
Occupational therapists	3	Worcester	Colleagues in Worcester were approached by the researcher	Sent with internal post from Worcester Hospital
Occupational therapists	3	Port Elizabeth	A colleague working in Port Elizabeth distributed the questionnaires.	Couriered to researcher
Total	114			

Strategies to increase the response rate were informed by a systematic review by Edwards Roberts, Clarke, DiGuiseppi, Pratap and Wentz (62). Some of these strategies were applied during data collection, the main strategy being that people are more likely to complete questionnaires based on a topic of interest to them. The questionnaires were handed out to therapists attending a workshop presented by the SASHT or who are enrolled for a post graduate diploma in hand therapy, it was therefore assumed that they have an interest in the

field and that there would be an interest in the topic under investigation. The authors of the systematic review referred to above found that in cases where recorded delivery was used, the odds of response more than doubled (62). The researcher opted to use a hardcopy instead of a web based copy as the attendance register at the courses could serve as recorded delivery of the questionnaire. They also found that that contacting the respondents before sending the questionnaire as well as follow up contact will increase the response rate (62), another reason for using a hard copy, as this ensured face to face contact with the research respondents. Additionally, hard copy surveys have been found to have greater response rate than web based surveys (63).

3.8 Data Management

The completed questionnaires were stored in a file. They were kept separate to the informed consent form, which were filed in a separate file and both kept in a locked cabinet to which no one had access but the researcher. The researcher made use of a data capturer to record the data.The data were entered into Microsoft Excel by the data capturer. Fifty percent of the captured data were checked for accuracy by the researcher by randomly selecting questionnaires and checking the information in the Excel spread sheet. The researcher met regularly with the data capturer to ensure that questions were addressed throughout the process.

3.9 Data Analysis

All analyses were performed in Statistica (ver 11 – 2013), with the assistance of a statistician. The data were analysed using descriptive statistics for continuous as well as nominal (categorical) data. The continuous data (years of experience and years of experience in the field of hand therapy) were checked for normality and the appropriate measures of central tendency and dispersion were calculated. Data were not normally distributed therefore medians and ranges were calculated. The frequencies and proportions were calculated for the categorical variables.

Two-by-two tables were constructed to compare frequency of use and years of experience, respondent's practice setting and holding a post graduate qualification in the field of hand therapy. The chi-square test of association was used to establish if any associations exist between these variables. A significance level of 5% was used for all comparisons.

3.10 Ethics

Permission for the research was obtained through the Health Research Ethics Committee of Stellenbosch University (ethics reference number: S13/02/029). The following principles of ethics as described in the Alma Ata declaration were upheld during the course of this research study: Beneficence, Non – Maleficence, Confidentiality, Justice and Autonomy

The respondents did not directly benefit in any way from their participation. The greater community of occupational therapists working in the field of hand therapy will benefit at the point at which the research findings are disseminated, as it will add to the body of knowledge of hand therapy practice within the South African context. The results from this research study will be disseminated through presentations at SASHT courses, or publication in the South African Journal of Occupational Therapy. The results will also be shared with the study respondents.

Confidentiality was maintained throughout the research study. Personal information (name and contact telephone number) gathered was voluntary and kept confidential at all times. The researcher kept the information in a safe place to which no other person had access. A code was assigned to each participant on the questionnaire they completed to ensure that the respondents' names are not on the questionnaire. No information was made available that could have an impact on the respondents career. The data capturer also did not have access to the names of the respondents of the study.

The research respondents, i.e. occupational therapists, are not part of a vulnerable group as the research study investigated their practice in general and did not pertain to a specific client or client group. Therapists that took part in the research study were made to feel safe and were assured of confidentiality. Novice therapists were acknowledged and they were at no point made to feel vulnerable due to inexperience or lack of expertise. No client information was needed or used during this research study.

Justice was upheld as there is no prejudice with regards to any of the demographic information that was supplied in the first section of the questionnaire. Respondents gave informed consent in order to participate in the research study. They were informed in detail about the purpose of the research to allow them to make an informed decision as to whether they wished to participate.

CHAPTER 4: RESULTS

4.1 Introduction

The results are presented under the section headings as they occurred in the questionnaire. Demographic information (practice setting, year of practice, years of practice in hand therapy, institution through which respondents received their qualification in occupational therapy, post graduate qualification and diagnostic groupings seen in practice setting) are followed by frequency of use of measurement tools and reasons for not using measurement tools. Associations between frequency of use of measurement tools and some of the demographic information are also presented in this chapter.

4.2 Response Rate

Of the 114 possible respondents, 81 questionnaires were completed and returned to the researcher, representing a response rate of 71%. All 81 completed questionnaires were analysed. There were missing data in each section of the questionnaire. Missing responses (i.e. items that were not completed by the respondents) were reported for each section of the questionnaire. None of the respondents requested an Afrikaans version of the questionnaire.

4.3 Demographic Information

The demographic characteristics of respondents are shown in Table 4.1. The median years of experience as occupational therapists were higher than the years of experience in hand therapy. The majority work in private practice and few had a post graduate qualification in hand therapy. Seven respondents did not indicate their number of years of experience in hand therapy.

Table 4.1: Demographic Variables for Respondents (n = 81)

Variable	Median (Min-max)
Years of practice as an OT	5.0 (0.4 -33.0)
Years of practice in hand therapy	2.5 (0.0 -26.0)
Practice setting	**No. (%)**
Government sector	32 (39.5)
Private sector	49 (60.5)
Total	81 (100.0)
Institution for OT qualification	
University of Pretoria	14 (17.3)
University of Witwatersrand	10 (12.4)
University of Cape Town	12 (14.8)
University of Free State	12 (14.8)
Stellenbosch University	23 (28.4)
University of the Western Cape	6 (7.4)
University of KwaZulu Natal	3 (3.7)
University of Limpopo	1 (1.2)
Total	81 (100.0)
Post graduate qualification	
Yes	15 (18.5)
No	66 (81.5)
Total	81 (100.0)
Type of post graduate qualification in hand therapy	
Diploma in Hand therapy	12 (80.0)
Masters in Hand therapy	3 (20.0)
Total	15 (100.0)

Due to the discrepancy in experience in occupational therapy compared to hand therapy a further analysis was done to determine the number of respondents with more than five years' experience versus less than five years' experience. The results indicated that 22 (27.2%) of the respondents had more than five years' experience in the field of hand therapy while 52 (64.2%) had less than five years' experience.

Further investigation showed that the majority of therapists with more than five years' experience were working in private practice (see Figure 4.1). Of the 81 respondents 16 (19.8%) held post graduate qualifications not directly related to hand therapy.

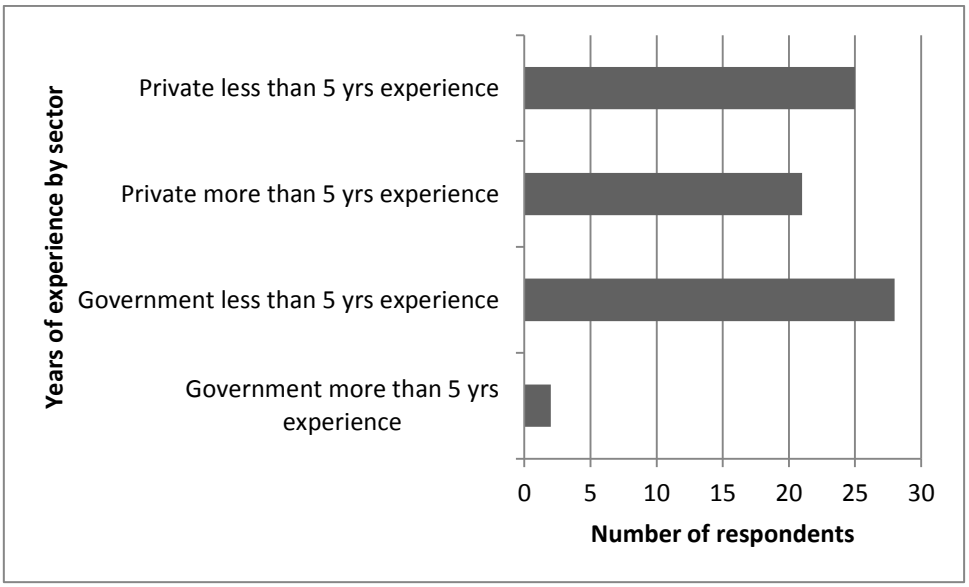

Figure 4.1: **Experience per sector (n=74**)

In item 7 of the questionnaire (see Appendix 1) respondents indicated the frequency with which they treated patients with specific diagnoses. Frequencies were calculated to determine the number of respondents who treated each diagnosis regardless of frequency.

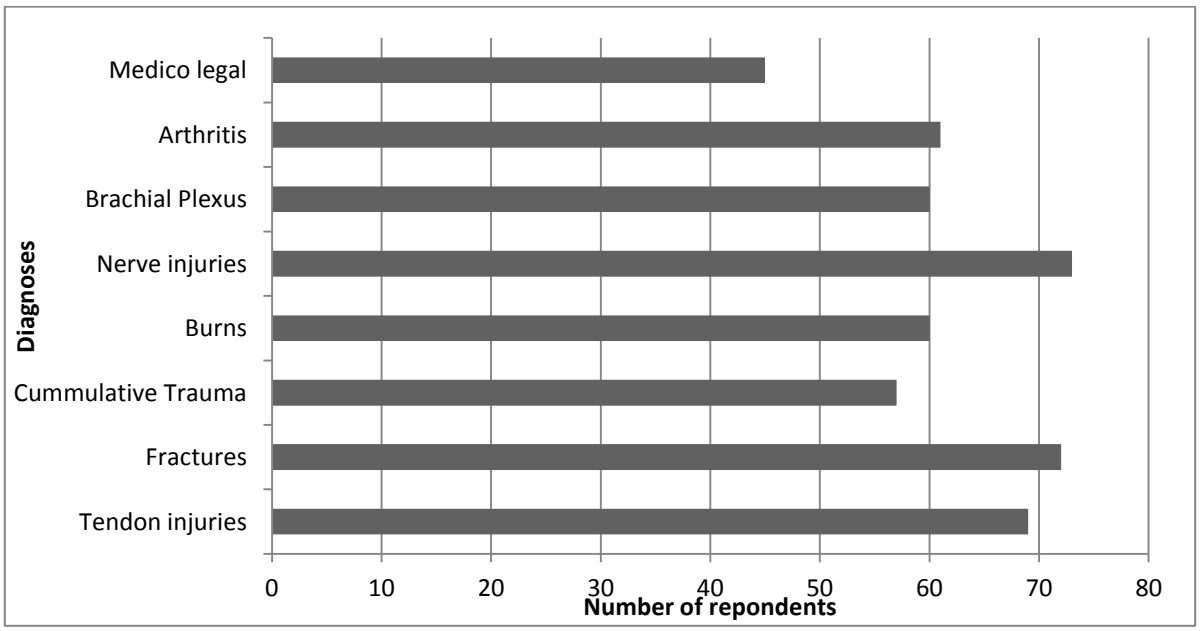

Figure 4.2: **Number of Respondents per diagnosis (n=81)**

Diagnoses that were seen most commonly were nerve injuries (73 of 81, 90.1%), fractures (72 of 81, 88.8%) and tendon injuries (69 of 81, 85.1%).

Further analyses were done to determine the frequency with which respondents treated these conditions (see Figure 4.3, 4.4 and 4.5).

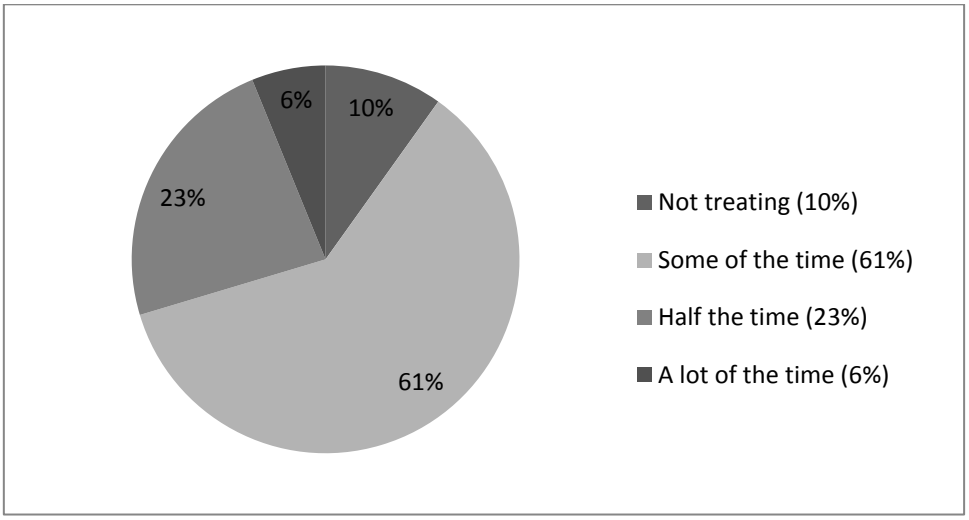

Figure 4.3: **Frequency of treating nerve injuries (n = 81**)

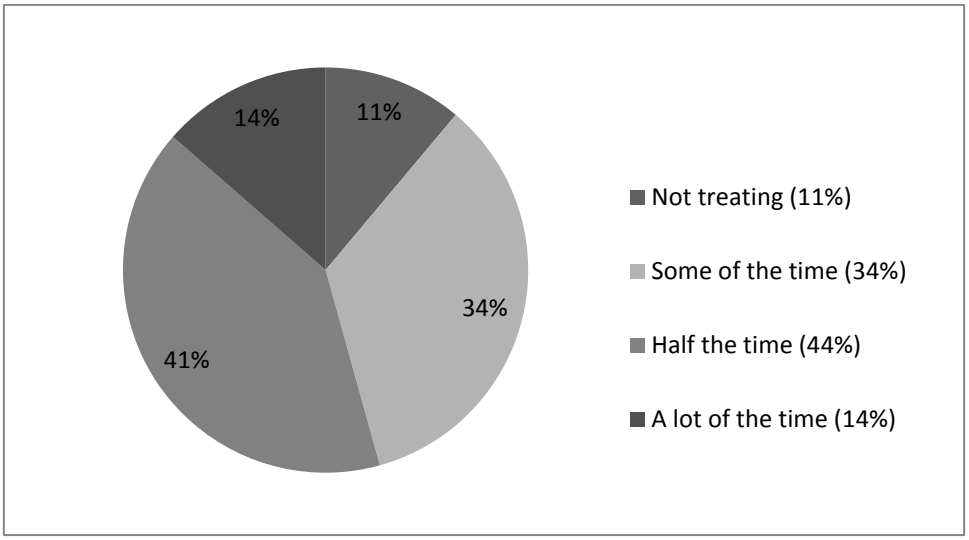

Figure 4.4: **Frequency of treating fractures (n = 81)**

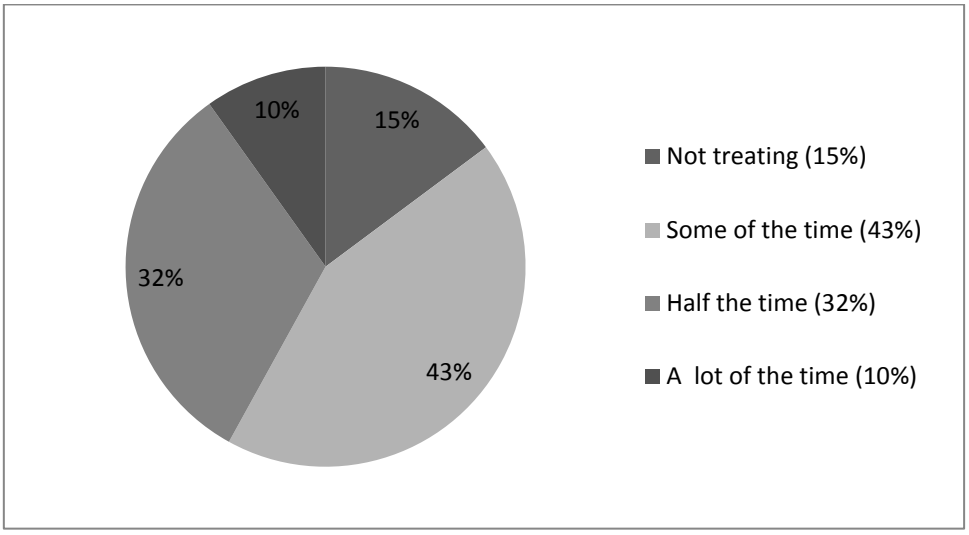

Figure 4.5: Frequency of treating tendon injuries (n = 81)

4.4 Use of Measurement Tools

The categories indicating frequency of use of the measurement tools contained in the questionnaire (section 2 of the questionnaire, see Appendix 1) were collapsed to identify the measurement tools that were used frequently. The category 'not use at all' remained unchanged. The categories 'some times' and 'seldom' were collapsed and relabelled as 'infrequently' and 'frequently' and 'very frequently' were collapsed into a single category labelled 'frequently'.

The measurement tools that were not used at all are illustrated in Figure 4.6 below. The measurement tools with the highest percentage of respondents who indicated they did not use them at all were the Hand Assessment Tool (HAT) (76 of 80, 95.0%), the Jebsen test of Hand Function (73 of 79, 92.4%), the SF-12 Physical Score (71 of 72, 98.6%) and the Short form-36 (70 of 72, 97.2%).

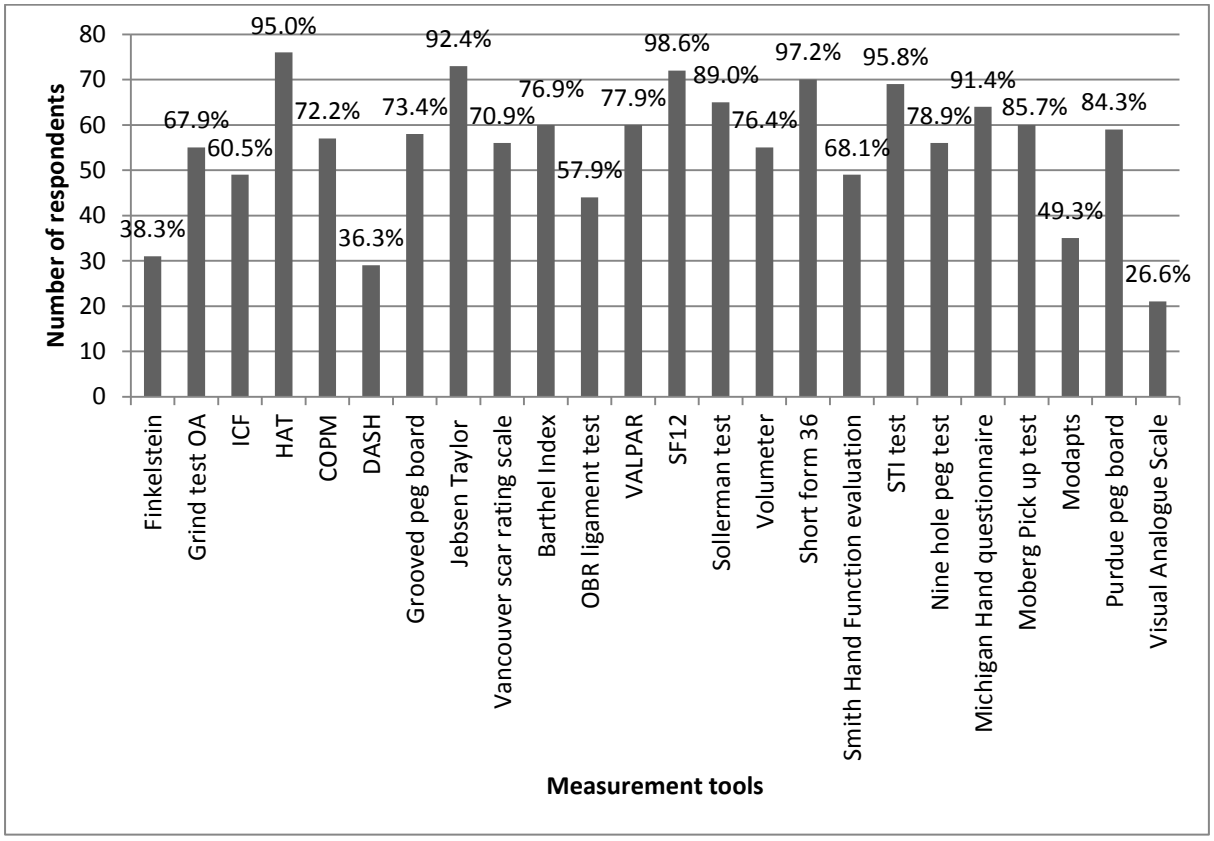

Figure 4.6: Measurement tools not used at all

Figure 4.7 shows the measurement tools that were used infrequently. The ten tools that were used most frequently are shown in Figure 4.8.

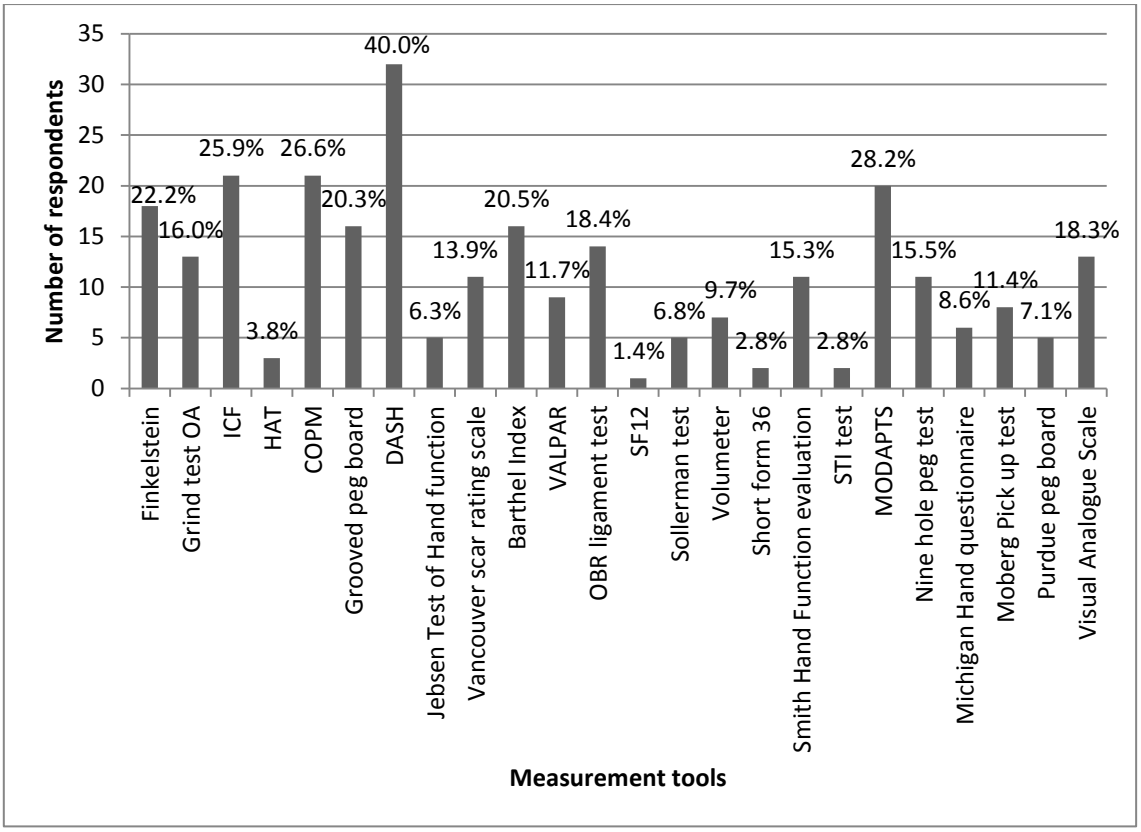

Figure 4.7: Measurement tools used infrequently

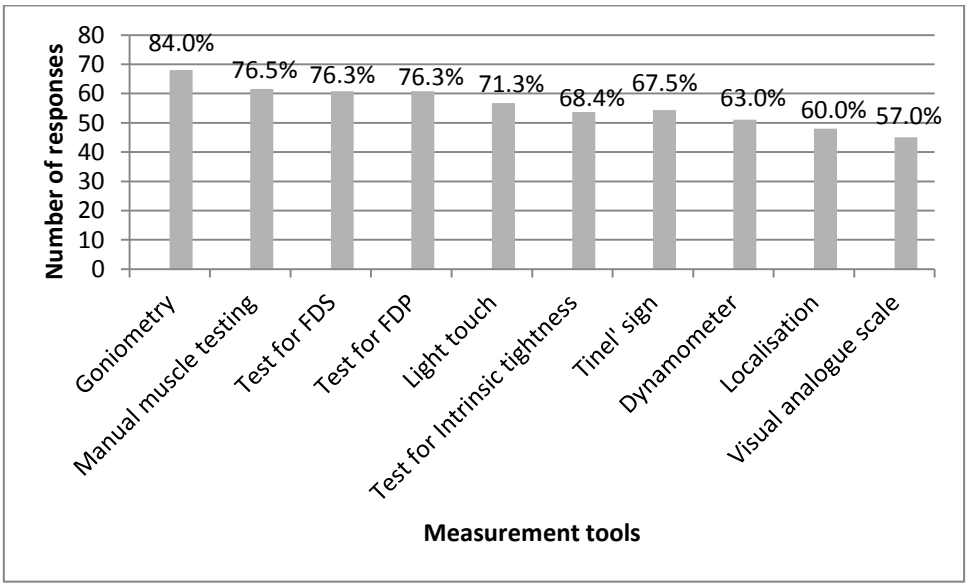

Figure 4.8: **Measurement tools used most frequently**

Range of motion measurement (68 of 81, 84.0%) with a goniometer, muscle strength measurement by means of manual muscle testing (62 of 81, 76.5%) and testing for function of flexor digitorum profundus and superficialis (61 of 81, 76.3%) proved to be the most frequently used measurement tools.

In the final section of the questionnaire the respondents could add measurement tools used in their practice that were not listed in the questionnaire. The respondents listed the following:

- Self-developed test -of hand function – observation during a standing or lifting and carrying test
- MODAPTS fine motor assessments
- Unilateral and bilateral lifting/ carrying protocol
- Tape measure
- Electronic Dynamometer
- Ashworth muscle testing (neurology)
- Vigorimeter
- Central slip test
- Self-developed upper limb ADL questionnaire and functional test
- Overhead functional work tasks (non-standardised)

4.5 Reasons for not using Measurement Tools

Four tests were not used at all by the majority of respondents. Reasons indicated for this are shown in Table 4.2. The 'not applicable responses' column is related to the number of respondents who indicated that they did use the tool in question either 'infrequently' or 'frequently' or who offered their own reason for non-use (see Appendix 4).

Table 4.2: Reasons for not using measurement tools (n = 81)

	Missing responses	Not available	No training in use	Monetary constraints	Time constraints	Not applicable in setting	Not familiar	Not applicable responses
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**
HAT	1 (1.2)	18 (22.2)	10 (12.3)	0 (0.0)	2 (2.4)	1 (1.2)	42 (51.8)	7 (8.6)
The Jebsen test of hand function	2 (2.5)	38 (46.9)	4 (4.9)	2 (2.4)	5 (6.7)	2 (2.4)	22 (27.1)	6 (7.4)
SF 12 Physical Score	8 (9.8)	23 (28.4)	4 (4.9)	0 (0.0)	1 (1.2)	2 (2.5)	39 (48.1)	4 (4.9)
Short Form 36	9 (11.1)	24 (29.7)	5 (6.1)	0 (0.0)	1 (1.2)	3 (3.7)	36 (44.4)	3 (3.7)

Figure 4.6 includes all of the performance tests that were included in the list of 44 measurements tools. Table 4.3 below shows the reasons respondents offered for not using the listed performance test. Respondents indicated all the reasons that applied. The 'not applicable responses' column is related to the number of respondents who indicated that they do use the tool in question either 'infrequently' or 'frequently' or who offered their own reason for non-use (see Appendix 4).

Table 4.3: Reasons listed for not using performance tests (n = 81)

	Missing responses	Not available	No training in use	Monetary constraints	Time constraints	Not applicable in setting	Not familiar	Not applicable responses
	No. (%)	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**
Grooved peg board	2 (2.5)	38 (46.9)	4 (4.9)	1 (1.2)	5 (6.2)	3 (3.7)	14 (17.3)	14 (17.3)
Moberg pick up test	11 (13.6)	33 (40.7)	5 (6.2)	2 (2.5)	2 (2.5)	2 (2.5)	19 (23.5)	7 (8.6)
MODAPTS	10 (12.3)	18 (22.2)	2 (2.5)	1 (1.2)	13 (16.0)	8 (9.9)	4 (4.9)	25 (30.9)
Nine hole peg test	10 (12.3)	35 (43.2)	4 (4.9)	1 (1.2)	7 (8.6)	4 (4.9)	12 (14.8)	8 (9.9)
Purdue peg board	11 (13.6)	40 (49.4)	2 (2.5)	1 (1.2)	4 (4.9)	3 (3.7)	12 (14.8)	8 (9.9)
Smith Hand function evaluation	9 (11.1)	33 (40.7)	1 (1.2)	2 (2.5)	8 (9.9)	3 (3.7)	6 (7.4)	19 (23.5)
Sollerman test of hand function	8 (9.9)	38 (46.9)	2 (2.5)	3 (3.7)	2 (2.5)	0 (0.0)	20 (24.7)	8 (9.9)
STI test	9 (11.1)	36 (44.4)	2 (2.5)	3 (3.7)	0 (0.0)	0 (0.0)	27 (33.3)	4 (4.9)
Valpar	4 (4.9)	43 (53.0)	4 (4.9)	7 (8.6)	5 (6.2)	5 (6.2)	2 (2.5)	11 (13.6)

From Tables 4.2 and 4.3 it is clear that the most frequently listed reasons for not using these measurement tools at all were, lack of availability in the respondents practice area (option 1), and lack of familiarity with the particular measurement tools (option 6). There was also a section in this part of the questionnaire that allowed the respondents to document any other reasons for not using the measurement tools (see Appendix 4).

4.6 Associations between Variables

Results from the Chi-square test of associations are presented. All the associations were tested but only those that were significant are reported. No associations were found for 28 of the 44 measurement tools included in the questionnaire. There were however instances in which significantly strong associations were found. Table 4.4 illustrates the results of the association between frequency of using particular measurement tools and respondents' practice settings.

Table 4.4: Frequency of use of Measurement Tools and Practice Setting

Assessment	Practice setting		Not at all	Infrequent	Frequent	Chi Square	df	P value
		No.	No. (%)	No. (%)	No. (%)			
Dynamometer	Private	49	5 (10.2)	3 (6.1)	41 (83.7)	24.50	4	< 0.001
	Government	32	12 (37.5)	10 (31.3)	10 (31.3)			
	Total	81	17 (21.0)	13 (16.0)	51 (63.0)			
Finkelstein test	Private	49	19 (38.8)	5 (10.2)	25 (51.0)	15.98	4	0.003
	Government	32	12 (37.5)	13 (40.7)	7 (21.9)			
	Total	81	31(38.3)	18 (22.2)	32 (39.5)			
Grind test for OA of the CMCJ	Private	49	29 (59.2)	7 (14.3)	13 (26.5)	10.15	4	0.038
	Government	32	26 (81.3)	6 (18.8)	0 (0.0)			
	Total	81	55 (68.0)	13 (16.0)	13 (16.0)			
Grooved peg board	Private	47	29 (61.7)	15 (31.9)	3 (6.4)	12.40	4	0.015
	Government	32	29 (90.6)	1 (3.1)	2 (6.3)			
	Total	79	58 (73.4)	16 (20.3)	5 (6.3)			
Manual Muscle testing	Private	49	0 (0.0)	11 (22.5)	38 (77.6)	13.26	3	0.004
	Government	32	0 (0.0)	9 (28.1)	23(71.9)			
	Total	81	0 (0.0)	20 (24.7)	61(75.3)			
Semmes Weinstein Monofilaments	Private	41	10 (24.4)	8 (19.5)	23 (56.1)	15.98	4	0.003
	Government	32	19 (59.4)	9 (28.1)	4(12.5)			
	Total	73	29 (39.7)	17 (23.3)	27 (37.0)			
Test for localisation	Private	48	7 (14.6)	13 (27.1)	28 (58.3)	11.57	4	0.021
	Government	32	1 (3.1)	11 (34.4)	20 (62.5)			
	Total	80	8 (10.0)	24 (30.0)	48 (60.0)			

Respondents in private practice used some of the tools more frequently than respondents within a government hospital or setting. It can be seen that working in private practice was significantly associated with using a dynamometer ($p < 0.001$) and doing the Finkelstein test ($p = 0.003$). It is also evident that employment in government settings was significantly associated with using the test for localisation ($p = 0.021$) and with not using Semmes Weinstein Monofilaments ($p = 0.003$), the grind test ($p = 0.038$) or the grooved peg board ($p = 0.015$) at all.

Table 4.5 shows the associations between the frequency of use of a specific measurement tool and whether the participant has more than or less than five years' experience in the field of hand therapy.

Table 4.5: Frequency of use of measurement tools and years of experience

Assessment	Years' experience		Not at all	Infrequent	Frequently	Chi Square	df	P value
		No.	No. (%)	No. (%)	No. (%)			
The DASH Questionnaire	>5 years	22	3 (13.6)	12 (54.6)	7 (31.8)	16.78	4	0.002
	<5 years	51	22 (43.1)	19 (37.3)	10 (19.6)			
	Total	73	25 (34.5)	31 (42.5)	17 (23.3)			
Dynamometry	>5 years	22	1 (4.6)	1 (4.6)	20 (90.9)	10.24	4	0.037
	<5 years	52	14 (26.9)	11(21.2)	27 (51.9)			
	Total	74	15 (20.3)	12 (16.2)	47 (63.5)			
The Michigan Hand Questionnaire	>5 years	18	14 (77.8)	4 (22.2)	0 (0.0)	7.47	2	0.024
	<5 years	46	45 (97.9)	1 (2.2)	0 (0.0)			
	Total	64	59 (92.2)	5 (7.8)	0 (0.0)			
The Moberg pick up test	>5 years	18	13 (72.2)	5 (27.8)	0 (0.0)	8.96	3	0.030
	<5 years	46	42 (91.3)	3 (6.5)	1 (2.2)			
	Total	64	55 (86.0)	8 (12.5)	1 (1.6)			
Semmes Weinstein Monofilaments	>5 years	19	2 (10.5)	5 (26.3)	12 (63.2)	10.40	4	0.034
	<5 years	48	23 (47.9)	12 (25.0)	13 (27.1)			
	Total	67	25 (37.3)	17 (25.4)	25 (37.3)			
Short form 36	>5 years	19	17 (89.5)	2 (10.5)	0 (0.0)	5.10	1	0.024
	<5 years	47	47 (100.0)	0 (0.0)	0 (0.0)			
	Total	66	64 (97.0)	2 (3.0)	0 (0.0)			
Test for light touch	>5 years	21	0 (0.0)	4 (19.1)	17 (81.0)	9.67	4	0.046
	<5 years	52	2 (3.9)	13 (25.0)	37 (71.2)			
	Total	73	2 (2.7)	17 (23.3)	54 (74.0)			
Test for localisation	>5 years	21	3 (14.3)	4 (19.0)	14 (66.7)	12.55	4	0.014
	<5 years	52	3 (5.8)	18 (34.6)	31 (59.6)			
	Total	73	6 (8.2)	22 (30.1)	45 (61.6)			

The results of the analysis showed a significant association between having more than five years of experience and the frequency with which the measurement tools are used. For example respondents with more than five years' experience were significantly more likely to make frequent use of dynamometry ($p = 0.037$) and Semmes Weinstein monofilaments ($p = 0.034$).

Table 4.6 shows the associations between frequency of using measurement tools and having a post graduate qualification in the field of hand therapy.

Table 4.6: Frequency of use of Measurement Tools and Post Graduate Qualification in Field of Hand Therapy

Assessment	Post graduate qualification		Not at all	Infrequent	Frequently	Chi Square	df	P value
		No.	No. (%)	No. (%)	No. (%)			
Barthel Index	No	66	51 (77.3)	15 (22.7)	0 (0.0)	12.14	4	0.016
	Yes	12	9 (75.0)	1 (8.3)	2(16.7			
	Total	78	60 (77.0)	16 (20.5)	2 (2.6)			
Finkelstein test	No	66	30 (45.5)	15 (22.7)	21 (31.9)	13.95	4	0.007
	Yes	15	1 (6.7)	3 (20.0)	11 (73.3)			
	Total	81	31(37.3)	18 (22.2)	32 (39.5)			
Grind test for OA of the CMCJ	No	66	49 (74.2)	9 (13.6)	8 (12.1)	13.96	4	0.007
	Yes	15	6 (40.0)	4 (26.7)	5 (33.3)			
	Total	81	55 (68.0)	13 (16.0)	13 (16.0)			
Grooved peg board	No	65	52 (80.0)	10 (15.4)	1 (3.1)	11.06	4	0.026
	Yes	14	6 (42.7)	6 (42.9)	2 (14.3)			
	Total	79	58 (73.4)	16 (20.3)	4 (5.1)			
Moberg pick up test	No	59	54 (91.5)	3 (5.1)	2 (3.4)	20.17	3	<0.001
	Yes	11	6 (54.6)	5 (45.5)	0 (0.0)			
	Total	70	60 (85.7)	8 (11.4)	2 (2.9)			
Oedema measurement: Landmark	No	60	28 (46.7)	10 (16.7)	22 (36.6)	11.79	4	0.019
	Yes	12	1 (8.3)	2 (16.7)	9 (75.0)			
	Total	72	29 (40.3)	12 (16.7)	31(43.1)			
Semmes Weinstein monofilaments	No	61	29 (47.5)	16 (26.2)	16 (26.2)	19.98	4	<0.001
	Yes	12	0 (0.0)	1 (8.3)	11 (91.7)			
	Total	73	29 (39.7)	17 (23.3)	27 (37.1)			
Test for extrinsic tightness	No	60	18 (30.0)	15 (25.0)	27 (45.0)	10.04	4	0.040
	Yes	12	1 (8.3)	1 (8.3)	10 (83.3)			
	Total	72	19 (26.4)	16 (22.2)	37 (51.4)			
Vancouver scar rating scale	No	65	50 (76.9)	5 (7.7)	10 (15.4)	14.17	4	0.006
	Yes	14	6 (42.9)	6 (42.9)	2 (14.3)			
	Total	79	56 (71.0)	11 (13.9)	12 (15.1)			

From the results of the analysis it seems that therapists with a post graduate qualification in the field of hand therapy used some of the measurement tools listed in Table 4.7 more frequently than those without a post graduate qualification in this field. The use of Semmes Weinstein Monofilaments ($p < 0.001$), extrinsic tightness test ($p = 0.040$) and oedema measurement: landmark test ($p = 0.019$) was significantly associated with holding a post graduate qualification in the field of hand therapy.

Table 4.7 provides a summary of the measurement tools for which an association was found along with the variables included in the analyses. There were associations between frequency of use and all three variables for the Semmes Weinstein Monofilaments.

Table 4.7: Measurement tools and variables found to be associated

Measurement tool	Practice setting	Years of experience	Post graduate qualification
The Barthel Index			✓
The DASH Questionnaire		✓	
Dynamometry	✓	✓	
The Finkelstein test	✓		✓
Grind test of OA of the CMCJ	✓		✓
Grooved peg board	✓		✓
Manual muscle testing	✓		
The Michigan Hand Questionnaire		✓	
The Moberg pick up test		✓	✓
Oedema measurement: Landmark			✓
Semmes Weinstein Monofilaments	✓	✓	✓
Short form 36		✓	
Test for extrinsic tightness			✓
Test for light touch		✓	
Test for localisation	✓	✓	
The Vancouver Scar rating scale			✓

4.7 Summary

In this chapter the researcher reported the results obtained through the analysis of the data. The results showed that 22 (27.2%) of the respondents had more than five years' experience in the field of hand therapy while 52 (64.2%) had less than five years. It was also found that the more experienced therapists worked in the private sector with two (0.03%) experienced therapists being employed in the public sector. The diagnoses that were seen most commonly were nerve injuries (90.1%), fractures (88.8%) and tendon injuries (85.1%). Of the 81 respondents 15 (18.5%) held post graduate qualifications in the field of hand therapy. Range of motion measurement (68 of 81, 84.0%) with a goniometer, muscle strength measurement by means of manual muscle testing (62 of 81, 76.5%) and testing for function of flexor digitorum profundus and superficialis (61 of 81, 76.3%) proved to be the most

frequently used measurement tools. Performance tests were used infrequently or not at all. The most frequently listed reasons for not using these measurement tools at all were that they were not available in the respondents practice setting or they were not familiar with them. Significant associations were found between frequency of using measurement tools and practice setting, years of experience and holding a post graduate qualification in the field of hand therapy. There was a significant association between working in the private sector and using a dynamometer ($p < 0.001$). There were significant associations between working in government settings and not using Semmes-Weinstein monofilaments ($p = 0.003$) at all and with frequent use of the test for localisation ($p = 0.021$). Therapists with more than five years' experience in the field of hand therapy were significantly more likely to use Semmes Weinstein monofilaments ($p = 0.034$) as were those holding a post graduate qualification in hand therapy ($p <0.001$).

CHAPTER 5: DISCUSSION

This chapter will discuss the achievement of the five research objectives listed below:

1. To describe the demographic characteristics of therapists included in the study.
2. To determine which measurement tools occupational therapists use for assessing the upper limb.
3. To establish the frequency with which each measurement tool is used.
4. To describe the factors influencing the frequency of use of the measurement tools.
5. To determine the characteristics of therapists who use measurement tools frequently as well as those who use them infrequently by establishing whether associations exist between variables.

5.1 Objective 1: To describe the Demographic Characteristics of Therapists included in the Study

The survey was conducted among a sample of 81 occupational therapists from five provinces in South Africa (Western Cape, Northern Cape, Eastern Cape, KwaZulu Natal and Gauteng). These are the provinces which are represented with regards to membership to the South African Society of Hand Therapists (SASHT) (1). One does however have to consider that not all hand therapists are necessarily members of SASHT. There was representation from both government and private practice settings as can be seen in Table 4.1 (p. 26). A large variation in the amount of experience as an occupational therapist was seen in the sample with the median for years of experience being five years with the minimum years recorded as four months and the maximum 35 years of experience. The sample therefor ranged from inexperienced community service therapists to very experienced therapists.

The sample did however contain fewer therapists with more than five years' experience (27.2%) in the field of hand therapy. Figure 4.1 (p. 27) shows that in this sample of therapists working in the field of therapy to the upper limb, the expertise lay within the private sector as 21 therapists (27.8%) in private practice had more than five years' experience and only 2 therapists (0.03%) in government had more than five years' experience.

One can assume that in this sample, the less experienced therapists working in government settings may not be supervised by an experienced colleague or may even be supervised by a person from another health care profession. This could be related to the findings that there seems to be less expertise (therapists with more than 5 years' experience in the field) in therapists working in government facilities. Steenbergen and Mackenzie (64) found that

newly qualified therapists need professional support in order for them to develop the skill of clinical reasoning. The authors argued that clinical reasoning is pivotal in the selection and use of measurement tools in the assessment of the upper limb. This point will be explored further in the discussion (section 5.4: Objective 5).

Respondents represented all eight of the tertiary institutions offering occupational therapy qualifications in South Africa. There were however more respondents who qualified at Stellenbosch University (28.4%). This might be attributed to two possible reasons. There were three data collection opportunities in the Western Cape and if one can assume that therapists who studied at Stellenbosch University are more likely from the Western Cape and that after completion of their studies they stay in the Western Cape or after community service return to the Western Cape, there would be more representation from such therapists to the sample (65). This would however then also have been the case for therapists who studied at the University of Cape Town and the University of the Western Cape. Another possible reason could be a bias related to this research. As the researcher has been a lecturer at Stellenbosch University since August 2008, therapists who qualified after this time and who are familiar to the researcher might be more inclined to complete a questionnaire than therapists who are unfamiliar to the researcher.

There was also representation with regards to a post graduate qualification in the field of hand therapy as 15 of the research respondents (18.5%) had a post graduate qualification in this field. The requirements for admission to a postgraduate qualification in hand therapy from both Stellenbosch University and the University of Pretoria is a minimum of two years' experience in the field of hand therapy and that the applicant should be practicing within the field. Post graduate study is also expensive and time consuming and few people choose to embark on it, especially less experienced, younger therapists. This could account for the small number of therapists in this sample who held a post graduate qualification in hand therapy. The respondents also had to indicate if they held any other post graduate qualification, in a field not related to hand therapy. In this section 16 therapists (19.8%) indicated that they held other post graduate qualifications. Of the 16 respondents only three held a qualification equivalent to a post graduate diploma or a Master's degree, the other respondents listed a number of short courses, some even unrelated to the field of occupational therapy.

A further demographic characteristic of the sample was the diagnostic groupings respondent's treated in their practice settings. The three diagnostic groupings that made up most of the respondents' case load in their practice settings were: nerve injuries, fractures and tendon injuries (Figure 4.2, p. 27). This is consistent with the findings of Ihekire, Salawu

and Opadele (66) who investigated the causes of hand injuries in a developing country. Motor vehicle accidents, glass cuts, gunshot wound and injury due to machinery were the primary causes for injury to the hand in their study (66). It has also been the clinical experience of the researcher that these are the causes of hand injury in the South African context. Those types of mechanisms of injury will consequently lead to potential injury to the nerve, tendon or fracture of a bone in the upper limb (66). These results were consistent with literature, as were the types of diagnoses the study sample have to contend with.

A further breakdown was done to establish if these three injuries (tendon injury, nerve injury, fractures) were seen by respondents 'some of the time', 'half the time' or 'a lot of the time' (see Figures 4.3, 4.4 and 4.5, p. 28). From the analysis it can be seen that 6 of the 81 respondents saw nerve injuries a 'lot of the time', 10 saw tendon injuries 'a lot of the time' and 14 saw fractures 'a lot of the time'. This was relevant in order to establish the type of measurement tools one would expect the sample to use frequently. As illustrated in section 6 of the literature review (Measurement related to specific performance components or injury) there is clear evidence for the use of certain measurement tools with certain diagnostic groupings or categories. According to MacDermid (31) range of motion, muscle strength and sensibility are the primary complications following a nerve or tendon injury. As these were two of the most common conditions treated by the respondents, it was important to establish whether they employed the appropriate assessments to measure these aspects. This will be discussed further in section 5.2: Objective 2 and 3. The researcher therefore concludes that representivity of the sample of occupational therapists working in this field in South Africa cannot be judged.

5.2 Objective 2 and 3: Type and Frequency of use of Measurement Tools during the Occupational Therapy Assessment of the Upper Limb

The second objective of this study was to acquire an account of the type of measurement tools used during the occupational therapy assessment of the upper limb and the third objective aimed at establishing the frequency with which these measurement tools were used.

Based on the findings of the literature review and the demographic characteristics of the sample of occupational therapists included in this study, specifically the diagnostic groupings that account for most of the therapists' time use in clinical practice (tendon injury, fractures and nerve injuries), the researcher expected frequent use of the following assessments:

- range of motion, grip strength and sensibility (threshold tests followed by functional tests)
- Self-report questionnaires such as the DASH or the Short Form 36.
- Performance tests

For tendon injuries one would expect to encounter frequent assessment of range of motion (goniometry) and strength (manual muscle testing and/or dynamometry) (31,50,51). Additional measurement is however required to quantify the functional implications of the measurements mentioned above (51). In assessing patients following injury to a nerve, one would expect frequent use of measurement tools to assess range of motion, strength and sensibility (Semmes Weinstein Monofilaments and/or traditional threshold tests), including tactile discrimination (2 point discrimination, Shape Texture Identification test, Moberg pick up test, Nine hole peg test) (28,29,31,36,50,51). It is also clear from the literature that sensibility assessment should be graded as recovery progresses and cannot be determined by assessing by means of threshold testing only; functional performance tests are indicated (29,36). Measuring the effects of a fracture to the upper limb should be done by a combination of performance component assessment (range of motion and strength) and additional information about function that can be obtained with patient rated questionnaires like the DASH or the Short Form 36 (32,54).

The results showed, however, that the measurement tools used most frequently were goniometry (68 of 81 respondents, 84.0%) and manual muscle testing (62 of 81 respondents, 76.5%). This supported the findings in the literature, with the diagnostic groupings most seen in clinical practice by the respondents and the account of the type of measurement tools used but it does not serve towards measuring the outcome of an intervention. MacDermid's (31) study reporting the measurement of outcome following tendon or nerve injury concluded that in addition to other assessments (outcome measures), therapists are expected to report on range of motion and muscle strength (31). Law (9) agreed with this recommendation stating that the purpose of range of motion and muscle strength assessments is to discriminate between individuals and therefore should not be used to evaluate the outcome of an intervention (outcome measure). As a result, additional tests are needed in order to evaluate the outcome of the intervention and/or to evaluate the impact on occupational performance (6,31). The researcher expected to see frequent use of additional tests such as the DASH in conjunction with measurements of range of motion or muscle strength; however this was not the case.

The third and fourth most frequently used measurement tools were the Tests for FDS (61 of 81 respondents, 76.3%) and FDP (61 of 81 respondents, 76.3%) function. The test for

intrinsic tightness (54 of 79 respondents, 68.4%) and Tinel's sign (54 of 80 respondents, 67.5%) also appeared to be used frequently. These are all tests to either make or confirm a diagnosis. The same concern expressed above is relevant but this result correlates with the frequency with which tendon injuries were treated by the occupational therapists included in the study. This trend may be due to a fairly high incidence of incorrect diagnoses that therapists therefore have become accustomed to checking whether they agree with the diagnosis.

In the results of this study, the assessment of light touch was used frequently (57 of 80 respondents, 71.3%), which correlates with the findings related to the diagnostic groupings. The test for light touch is a sensation threshold test and one of the tests that will be used early in the treatment of a patient with an injury to a peripheral nerve (67). As the nerve recovers and sensation starts to improve in the predicted pattern of recovery, additional testing is required (67). In the present study however, additional testing was not done frequently, especially functional sensation testing such as Two Point Discrimination, STI test, Moberg Pick up test or the Nine Hole Peg test. Responsiveness of the Moberg Pick up test has been established and thus it can be used as an outcome measure (29). It is also a test that can easily be constructed and made relevant to a variety of contexts. There may be a number of reasons that the study respondents did not use it. Some of these reasons were identified in this research and will be discussed later in this chapter (section 5.3: Objective 4 Description of the factors impacting on frequency of use of the measurement tools).

Dynamometry was also used with frequency by the respondents included in this study (51 of 81 respondents, 63.0%). In the literature review done for this research there is evidence that this measurement tool is used to potentially confirm a diagnosis or to track patient progress (26). It has a standardised procedure and provides the therapist with information in order to discriminate between individuals (9). It can therefore not be used as an outcome measure. Another apprehension about the frequent use of dynamometry is the reliability of the specific measurement tools used in clinical practice. The reliability of the test and the procedure has been established (48,49), but as MacDermid (31) emphasises, the tool has to be calibrated regularly and the standardised procedure has to be used. It has been the experience of the researcher that this is not implemented in the South African context. Calibration of the dynamometer is difficult because it has to be sent abroad and the therapists will therefore be left without the measurement tool for a number of months. The researcher is aware of instances where colleagues prefer not to send the dynamometer for regular calibration as this leaves the practice setting without one of few standardised assessments for a long period of time. Thus, the researcher questions the reliability of the results obtained with such

dynamometers, especially if they are used in conjunction with outcome measures and or performance tests to provide evidence for intervention.

Localisation is the first of the functional sensation tests that should be used following peripheral nerve injury (67). The fact that respondents use it with frequency (48 of 80, 60.0%) is consistent with the diagnostic groupings most seen in clinical practice. The test for localisation does not however have established reliability, validity or responsiveness unlike alternatives such as the Semmes-Weinstein Monofilaments or the Shape Texture Identification (STI) test (29,33). The STI test is however not readily available within South Africa. Twenty seven of the 73 respondents (37.0%) who answered this question used the test for localisation more frequently than Semmes Weinstein Monofilaments which are available in South Africa.

The four measurement tools that scored the highest in terms of non-use (refer to Figure 4.5, p. 28) were the Hand Assessment tool (HAT) (76 of 80 respondents, 95%), the Jebsen Test of Hand Function (73 of 79 respondents, 92.4%), The SF-12 Physical Score (72 of 73 respondents, 98.6%) and the Short Form-36 (70 of 72 respondents, 97.2%). Of the four tests two are performance tests and two questionnaires. Other performance tests that were not used at all were the Smith Hand Function Evaluation (49 of 72 respondents 68.1%), the Sollerman Test of Hand Function (65 of 73 respondents, 89.0%), the Nine Hole Peg Test (56 of 71 respondents, 78.9%) and the Moberg Pick up test (60 of 70 respondents, 85.7%).The researcher is familiar with all four of these measurement tools, and has encountered them in clinical practice. The use of the Moberg Pick up test, the Nine Hole Peg Test and the Sollerman Test of Hand Function is recommended by prominent researchers in the field. A subtest of the Sollerman Test of Hand Function is used in Rosén and Lundborgs' (36) instrument for measuring outcome following nerve repair. Jerosch-Herold (29) demonstrated that the Moberg pick up test can be used as an outcome measure in the assessment following nerve repair. In a systematic review (37) investigating the clinimetric properties of instruments to asses hand injured patients' activities, the authors found evidence for the validity, reliability and responsiveness of the Nine Hole Peg Test, the Moberg Pick up Test and the Sollerman Test of Hand Function (37). Despite its standardised procedure no studies have been done to establish the validity, reliability or responsiveness of the Smith Hand Function Evaluation (37). The findings from this study illustrate that despite the fact that these tests contribute to assessing performance and have standardised procedures, they were still not used by the respondents of this study, due to inavailability.

Even though MacDermid (28), in earlier writings, used an example of the use of range of motion as a way in which to predict outcome following tendon repair, she also makes a very

strong argument for the necessity to not only assess the physical impairment (performance component) but also the occupational performance (28,31,32). Alarmingly, in the results depicting the measurement tools used most frequently (Figure 4.7, p. 30), there were no outcome measures or performance tests listed. One can therefore conclude that the respondents of this study did not have sufficient assessment findings to verify occupational performance issues. Based on the demographic characteristics, although respondents often treat nerve injuries, tendon injuries and fractures of the upper limb, they tended to use discriminative measurement tools which are also used by hand surgeons (26). This is disturbing as the primary concern of occupational therapists is occupation and occupational performance yet respondents in this study were not using measurement tools that will provide information about how treatment impacts on or enhances participation.

In addition to the outcome measures (performance tests and questionnaires) that were used 'seldom', 'sometimes' or 'not at all', The Disability of the Arm Shoulder and Hand Questionnaire (DASH) is of special interest. The DASH is an outcome measure that is available on the internet (open source) and can be translated into any language via the cross-cultural back translation process as described by the developers (11). An Afrikaans translated version of the questionnaire is available online (11). In a systematic review which evaluated the clinimetric properties of measurement tools used in hand therapy the DASH questionnaire was declared to be '*the most extensively studied tool, with positive rating for all criteria*' [(17) p. 230]. The DASH can be used with a variety of diagnostic groupings and the evidence for its use is overwhelming (11,17,18,22,28,31,32,38,39,54). There is a shorter version of the DASH, referred to as the Quick DASH and recently an iPad application was added to the list of available resources to increase its ease of use. In this study 29 of 80 respondents (36.2%) did not use the DASH at all (refer to Figure 4.5, p. 28). A number of reasons may have contributed to this finding. These are discussed later in this chapter (refer to section 5.3: Objective 4.)

Finally, the respondents also had an opportunity to add additional tests that were used in their practice setting, used frequently, but that are not listed in the questionnaire (refer to the list on p.31). One participant added the use of a '*self-developed upper limb ADL questionnaire and functional test*'. It has been the experience of the researcher and it is clear from the literature, that there are many tools with established validity, reliability and responsiveness (17,29,37) and yet clinicians chose to develop their own. This was consistent with findings in the literature review that illustrate that therapists continue to rely more on subjective assessments (19,24,25).

5.3 Objective 4: Description of the Factors impacting on Frequency of use of the Measurement Tools

The fourth objective of this study was to explore the factors impacting on the frequency of use of measurement tools during clinical practice. In this section the researcher will discuss the reasons for non-use or infrequent use of the measurement tools, chosen by the respondents of the study. The researcher will aim to explicate the impact these reasons have on the frequency of using specific measurement tools with outcome measures and performance tests (whether it is an outcome measure or not) being of special interest.

The reasons for infrequent or non-use of the measurement tools contained in the questionnaire, can be revisited in Table 4.2 and 4.3 on pages 31 and 32. The two main reasons for not using the four measurement tools that scored the highest in terms of not being used at all (The HAT, The Jebsen test of Hand Function, the SF 12 Physical score and the Short Form 36) were lack of availability and lack of familiarity. The researcher has only encountered one of these tools (the Jebsen test of Hand Function) being used in clinical practice.

Reasons for not using the performance tests listed in the questionnaire were the same as those given for the tools mentioned above (refer to Table 4.3, p. 32). This list of performance tests contains many of the tests already discussed earlier. A systematic review conducted by Van de Ven-Stevens, Munneke, Terwee, Spauwen and van der Linde (37) found that validity and reliability has not been established for the Grooved peg board and is questionable for the Purdue peg board. The fact that both of these tests have to be purchased overseas and are expensive could account for the fact that it is not readily available in clinical practice settings and therefore not used in South Africa. Kapandji's rule of 10 has been shown to have good validity and reliability as a test for quantifying opposition of the thumb, specifically for rheumatological conditions of the hand (68). The test procedure does not require any resources, as the patient opposes their thumb to certain landmarks on the hand being tested and a score out of ten is derived from there. Yet, eight respondents offered 'not available' as a reason for not using Kapandji's rule of 10. It is clear that the reason would most likely be that respondents were not familiar with the use of the measurement as one does not require the test to be 'available' in order to use it. With regards to the Smith Hand Function evaluation the most common reason for infrequent use was unfamiliarity with the tool. The Smith Hand Function evaluation is a performance test that shows how the patient engages the hand during activity and is not an outcome measure (37). Additional reasons for infrequent use of the Smith Hand Function evaluation that were offered by two respondents

were that it is '*outdated'* and '*too old'* (see Appendix 4). However, neither of these respondents used any other performance test as an alternative.

Twenty four of 80 respondents (30.0%) stated that they did not make use of the DASH due to time constraints. It has been the experience of the researcher that the DASH is the one assessment that is conducive to a busy clinical setting as the patient can complete the questionnaire in the waiting area prior to contact time with the clinician. The option of the Quick DASH can reduce the time spent completing the questionnaire even more (11). Of the 80 respondents who completed this section of the questionnaire, 12 (15.0%) indicated that the tool was not available in their area. As discussed previously, the DASH Questionnaire is available free of charge (open source) on the internet (11) and therefore this is not a valid reason for non-use. It is more likely that lack of familiarity is a more plausible reason for its non-use. This claim is supported by the fact that 11 respondents (13.8%) indicated that they were not familiar with the tool and 9 (11.3%) that they had received no training in the use of the tool. An Australian occupational therapy study conducted by Cook, McCluskey and Bowman (14) reported an increase in the use of outcome measures following training in their application and use. It is argued that the low use of upper limb measurement tools that are readily available to occupational therapists in South Africa calls for strategies to familiarise them with the tools that are available and to provide training in their use.

5.4 Objective 5: Association between Frequency of Use and Demographic Information

The final objective of this research was to establish whether associations exist between frequency of use and specific demographic characteristics of the research respondents. The variables under investigation were:

- The frequency of use of a specific measurement tool and a respondents' practice setting (private or government).
- The frequency of use of a specific measurement tool and the respondents' years of experience in hand therapy (< 5yrs and > 5yrs).
- The frequency of use of a specific measurement tool and whether the participant held a post graduate qualification in hand therapy.

As it is clear from the discussion above that outcome measures (performance tests and/or questionnaires) were used infrequently, the researcher aimed to establish if there was an association between the frequent use of these tools and practice setting, years of experience or holding a post graduate qualification in the field of hand therapy. The researcher collected

as much data as possible within the data collection period, however as there is no record of the number of occupational therapists practicing in this field a conclusion about the representativeness of the sample cannot be made. The information obtained can however still assist to firstly explain the current state of affairs and secondly to make recommendations to change the status quo.

5.4.1 Practice Setting

Frequent use of manual muscle testing was associated with private practice settings ($p = 0.004$) (refer to Table 4.4, p. 33). This could be attributed to the fact that you do not need any 'tools' in order to execute a muscle test. It may not therefore be a question of resources but rather of the skill of the clinician. Manual muscle testing is also an assessment clinicians learn as undergraduate students and the procedure is well documented (45,46). As discussed in the literature review, manual muscle testing should not be done in isolation and once progress is made in improving muscle strength, dynamometry should commence (47).

With regards to the frequent use of a dynamometer in the assessment of the upper limb, there is a significant association with working in a private practice setting ($p < 0.001$). It can be seen that therapists working in private practice were more likely to use a dynamometer than their counterparts in the government setting. There could be multiple reasons for this fact, none of which can be confirmed by the results of this research. Possible reasons for the infrequent use of dynamometers in government settings were that they may not have this equipment available. Secondly, clinicians in government settings might not have sufficient follow-up with their patients as dynamometers are used once there is improvement in muscle strength and it is possible that they do not have the resources to follow-up the patient beyond the initial acute stage. Thirdly, it could be related to the earlier findings that there seems to be less expertise (therapists with more than 5 years' experience in the field) among therapists working in government facilities. It may be that these therapists have yet to develop the clinical reasoning required to make decisions about which assessments to use but this has to be explored further. There were also therapists with less than five years' experience in the private practice settings, but as seen earlier they could most likely be supervised and mentored by more experienced therapists, which will assist them in developing their clinical reasoning skills (64).

It can also be seen from these results that there was a significant association between the frequent use of Semmes Weinstein Monofilaments and working in the private practice setting ($p = 0.003$) and the frequent use of the test for localisation and working in government

practice setting (p = 0.021). As discussed under section 5.2, the test for localisation is used earlier in the recovery following nerve injury but does not have proven reliability, validity or responsiveness; Semmes Weinstein monofilaments are a more sophisticated option (29,36,67). The previous arguments hold for this occurrence.

Baris describes how therapists are often required to follow a specific course of action due to policies, hospital settings or departmental traditions and in the process the patients' needs are not necessarily considered (69). She also reported on the environmental pressure of monetary constraints and human resource shortages resulting in too few therapists for the number of patients requiring treatment. This is a familiar reality in the South African context. As all the aspects described by Baris are relevant within the South African context, the researcher believes this to have a great impact on how decisions about assessment and treatment are made.

5.4.2 Years of Experience

The significant association between the frequent use of the DASH questionnaire and having more than five years' experience in the field of hand therapy (p = 0.002) (refer to Table 4.5, p. 34) could be due to the fact that therapists with more than five years' experience had more opportunity to be educated in the use of this outcome measure which has been shown to increase use (14). Therapists with more than five years' experience might also have developed the appropriate attitudes and skill (clinical reasoning) to make use of outcome measures in daily encounters with patients.

Dynamometry and Semmes Weinstein Monofilaments are interestingly also represented in Table 4.5. There is a significant association between having more than five years' experience and the frequent use of Semmes Weinstein Monofilament (p = 0.034) and dynamometry (p = 0.037). As both of these measurement tools were also found to be significantly associated with practice setting (i.e. private practice), one can therefore draw a further conclusion that experienced therapists in private practice are more likely to use these tools. This exploration for exploration in future research as to why practice setting and years of experience encourage therapists to use these assessments frequently.

The test for localisation was shown to have a significant association between being used 'infrequently' and less than five years' experience (p = 0.014). Four of 21 respondents with more than five years' experience (19.0%) versus 18 of 52 respondents with less than five years' experience (34.6%) use this test 'infrequently'. This correlates with the reasons

offered to explain the association between practice setting and the use of the test for localisation.

The Moberg pick up tests presented similar results. Although this test was not used frequently by the respondents of this study, it is however a test that has shown good responsiveness and sensitivity to change and can therefore be used as an outcome measure (29). This analysis showed that there was a significant association between using the Moberg test infrequently and having more than five years' experience ($p = 0.030$). The significant p value could also be attributed to the fact that the 42 of 46 respondents with less than five years' experience (91.3%) did not use the test at all versus 13 of 18 respondents with more than five years' experience (72.2%). In light of the fact that nerve injuries were treated regularly by this sample of therapists, the frequent use of a sensation test that is indicated only in the early stages of nerve recovery and the fact that outcome measures are not readily used suggests that the respondents in this study did not employ assessments that will provide evidence for interventions offered to patients following peripheral nerve injury.

5.4.3 Post graduate qualification

Table 4.6 on page 35 showed the significant associations between the frequency of use of some of the measurement tools and whether or not the respondents held a post graduate qualification in the field of hand therapy. Semmes Weinstein Monofilaments showed to be used frequently in the case of therapists with a post graduate qualification in the field of hand therapy ($p < 0.001$). Triangulating these findings then brings one to the conclusion that therapists with more than five years' experience, that hold a post graduate qualification in the field of hand therapy and work in private practice, used Semmes Weinstein Monofilaments frequently in the assessment of the upper limb. Monofilaments are a well-studied, easy to use tool that could easily be used by all therapists assessing the upper limb. One should therefore investigate further why this is not the case. As seen in Table 4.7 on page 36 monofilaments were the only measurement tool found to be associated with all three demographic characteristics in question. The Moberg pick up test showed to be significantly associated with infrequent use and therapists holding a post graduate qualification ($p < 0.001$).

Unfortunately, there also seemed to be a significant association between holding a post graduate qualification in the field of hand therapy and the frequent use of diagnostic tools (8), such as the Finkelstein test ($p = 0.007$), the grind test for osteo arthritis of the carpo metacarpal joint ($p = 0.007$) and the test for extrinsic tightness ($p = 0.040$). This would not

have been a concern if there was evidence that it was used in association with outcome measures and/or performance tests. It does however seem that these were the types of test that were used most frequently, and that their frequent use was even significantly associated with holding a post graduate qualification in the field of hand therapy. They were used frequently, more so than the assessments that could contribute to measuring outcomes of interventions offered in hand therapy. The necessity for such measures was discussed in the background and rational for this study and also made explicit in the literature review (refer to sections 2.4, 2.5 and 2.6 in the literature review). The evidence that interventions offered has a desirable outcome is needed for the South African context to demonstrate the effectiveness of occupational therapy interventions and will only be achieved through the use of outcome measures in assessment of the upper limb.

Decisions about which measurement tools are selected in the assessment of the upper limb is integral in the clinical reasoning process during encounters with patients. As occupational therapists, clinical reasoning is pivotal in the day to day management of patients. Chapparo and Ranka (3) explored two forms of clinical reasoning from various sources in the literature namely: diagnostic reasoning (70) and procedural reasoning (69). It is understood that these types of reasoning assist the therapist to progress from sensing the 'problem' of the patient to defining the 'problem' to finding a resolution in the form of a treatment plan (69). The notion of diagnostic reasoning is believed to begin even before the therapist and the patient are engaged in therapy. In sensing the 'problem' the therapist makes decisions about the information that is needed to guide further intervention. The therapist therefore decides even before approaching the client the type of assessments that will give sufficient information for appropriate treatment action. The procedural reasoning part entails the search for the definition of the problem and the selection of the appropriate treatment (69). This leaves the question about whether occupational therapists working with patients with upper limb conditions in South African employ this type of reasoning, as current trends suggest that the appropriate tools are not used with frequency.

There are a number of factors that influence the decision making process other than the ones described in the literature review (71). These influences are amongst other things, the political, economic and organisational aspects that have to be considered in the clinical setting (pragmatic reasoning). Schell and Cervero (72) explored the concept of pragmatic reasoning in addition to the notion of scientific reasoning and narrative reasoning. These aspects can have equal influence in the decision making process as that of the therapist's beliefs and attitudes. As discussed earlier, with reference to the work of Baris (69), it is a reality within the South African context that policies, hospital setting, departmental traditions,

monetary and human resource constraints can have adverse effects on service delivery. There are often simply just too few therapists and too many patients and therefor effective treatment proves difficult. Yet, in order to change this, the effects of occupational therapy interventions have to be shown through using appropriate measurement tools. Possible ways of changing this will be explored in the recommendations section in Chapter 6.

5.5 Summary

This chapter has shown that all the objectives for this study were achieved. As a result there is now up-to-date information about the measurement tools used in the occupational therapy assessment of the upper limb within a South African context. The measurement tools most frequently used are mostly tools used for the purpose of monitoring progress or confirming a diagnosis. The respondents in this study did not make frequent use of performance tests and/or outcome measures. It is concerning that the primary focus of occupational therapy should be on the performance components and not the occupational performance. It was found that the tools needed for the assessments of the diagnostic conditions mostly seen by the study sample were often the tools that were not used frequently. The reasons offered for not using test with frequency were that the measurement tools were not available in the respondents practice settings and that they were not familiar with the measurement tools. There were significant associations between the use of measurement tools and specific demographic characteristics. Having more than five years' experience was significantly associated with frequent use of the DASH, dynamometry and Semmes Weinstein monofilaments. This suggests that more experienced therapists tend to use some measurement tools more frequently. Working in the private sector and holding a post graduate qualification in the field of hand therapy were significantly associated with using Semmes Weinstein monofilaments. The fact that most of the experienced therapists were working in private practice is concerning considering the high proportion of the South African population who rely on government health services. These findings have important implications for undergraduate education programmes as well as continuing professional development programmes.

CHAPTER 6: CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

The section will present the conclusions drawn from this study, limitations related to the study and recommendations for the future.

6.1 Conclusion

The research objectives set out at the beginning of this research project were achieved. The research was conducted on a sample of occupational therapists required to carry out assessments of the upper limb. From the list of 44 measurement tools included in this study, it was found that tests used for the purpose of discrimination are used most frequently. It was also found that tests with well-established validity, reliability and responsiveness (outcome measures) that are available in South Africa are used infrequently. Occupational therapists also do not frequently make use of performance tests in their day to day assessment of patients with upper limb injuries. These findings are in line with findings from international studies as illustrated in the literature review. Significant associations were found between frequency of use and practice setting, years of experience and/or whether respondents hold a post graduate qualification in the field of hand therapy. It was also found, that in this sample of occupational therapists, therapists working in this field often do not hold a post graduate qualification (in the field of hand therapy), most likely have less than five years' experience and could be employed in either government of private practice settings. The expertise does seem to be mostly situated in the private practice setting. The reasons mostly offered for not using tools with frequency were that the therapists were not familiar with the tool or that it is not available within their practice setting.

The implications for these findings within the South African context are far reaching. As illustrated in the introduction and rationale for this study, we do not have a choice but to create evidence for interventions offered by occupational therapists in all practice settings This is an even greater necessity in the field of hand therapy, as it has been the experience of the researcher that very few of the international publications on intervention strategies for condition treated frequently in South Africa (tendon injuries, nerve injuries, fractures) can be applied to practice settings in South Africa. The information obtained through this research could aid to inform education and training activities geared towards continued professional development; on an undergraduate and post graduate level and assist to direct a research focus for hand therapy in the South African context.

6.2 Limitations

The sample consisted mostly of therapists who attended workshops for continued professional development purposes. The researcher is of the opinion that these therapists therefore have the desire to keep abreast and up to date with new developments in the field of occupational therapy. A limitation could be that therapists not attending workshops were not included in the study. Their participation in the research could possibly have yielded different results. In future studies, therapists not attending workshops should also be included.

A second limitation is related to the questionnaire. The final question in the first section of the questionnaire that required respondents to indicate the diagnostic groupings that make up a participant's typical caseload was not a well-constructed question. The question was not clear as it did not ask the participant about the case load at a particular moment in time. It has been the experience of the researcher that hand injuries fluctuate in terms of the number of cases of a specific diagnosis or conditions that present in a clinical setting at one point in time. The amount of time spent on a specific diagnostic grouping should be seen in the perspective of a specific time period. The researcher would in possible future use of this questionnaire ask respondents to indicate whether at a specific point in time e.g. over the last 2 months, they have seen patients in their practice setting with a particular diagnosis. The researcher is however of the opinion that this limitation would not necessarily have impacted on the results of the study, it might just have eased the process of completing the questionnaire.

Also related to the questionnaire a third limitation could be that The International Classification of Functioning (ICF) was included as a measurement tool on the questionnaire. The ICF is however not an assessment but a framework. This should also have been excluded from the final questionnaire. There were however facilities that used this framework to guide assessment. The researcher does not believe this limitation to have influenced the results of the study.

The researcher believes a fourth limitation to be the fact that the reasons offered on the questionnaire for infrequent use, might not be inclusive of all possible reasons for this phenomenon. Even though the therapists included in the pilot testing of the questionnaire ascertained that the reasons are representative and that space to add 'other' was included on the final questionnaire, one has to consider that respondents often don't make use of the option of adding information when confronted with a questionnaire. A recommendation with regards to this will follow below.

6.3 Recommendations

This section will present recommendations for research, practice and education that emerged from the study results.

6.3.1 Research

- The results from this research will be disseminated through publication and conference presentation in order to raise awareness about the trends in occupational therapy assessment of the upper limb within the South African context.

- Further research should be conducted to explore the clinical reasoning process occupational therapists employ when choosing a measurement tool for assessment of the upper limb. This should be done in order to construct and foster clinical reasoning amongst therapists working in the field of hand therapy, in relation to assessment trends. In answering this research question, one might also come to understand why therapists would use assessment for the purpose of discrimination rather than standardised assessment and/or outcome measures.

- Further research should be conducted among therapists not in attendance at workshops and should further explore the additional factors or reasons offered for not using measurement tools with frequency (mentioned as a limitation above). The researcher recommends a qualitative inquiry to address this as such an approach allows the researcher to view the question from multiple angles and perspectives. Thus allowing for a greater understanding of the phenomena under investigation.

6.3.2 Practice

- The implication of the findings from the research study has to be further explored. As discussed in the introduction, literature review and the discussion of this study, assessment drives practice and is required for evidence based practice and advancement of the profession. The researcher believes that the current trend in the occupational therapy assessment of the upper limb to have dire implications for the profession. A suggestion would be to collaborate with academics as well as clinicians in order to discuss the need and action towards changing practice trends. There is a clear need for further training about assessment methods and an active effort should be made to change the current use of assessments in this area.

6.3.3 Education

- Training in the use of outcome measures is a necessity. It has been proven to be effective in increasing the use amongst occupational therapists. Many of the measurement tools listed in the questionnaire used for the purpose of this research are easily accessible and can be made relevant to the South African context. Training by bodies such as the South African Society of Hand Therapists (SASHT) or the Occupational Therapy Association of South Africa (OTASA) should be directed towards an increased use of outcome measures in the occupational therapy assessment of the upper limb. The researcher therefore has to give feedback to respondents in the study, but also to OTASA and SASHT in order to stimulate the conversation about bringing about the changes that are urgently needed. The researcher is of the opinion that if therapists are brought to understand the implications for in appropriate assessment trends, attitudes will changes. Bodies such as SASHT and OTASA could also assist to bring about this change.

- Undergraduate education should also be reviewed in terms of content covered to establish the knowledge base needed for improved assessment practices as undergraduate students as well as qualified therapists. The researcher recommends collaboration with colleagues at tertiary institutions to ascertain which content in undergraduate programmes provide this underpinning as well as how much is covered or to what depth. Adjustments should then be made accordingly.

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APPENDIX 1

Participant code:	Date:
Ethics reference number: S13/02/029	Venue:

Survey

Research title: Occupational therapy assessment of the upper limb: Trends in South Africa

SECTION 1: Demographic information			
1	Practice setting (please tick the appropriate box)	**Private**	**Government**
2	Years of practice		
3	Years of practice in field of hand therapy		

4	Institution through which you obtained your degree / diploma in occupational therapy (please tick the appropriate box)				
	Stellenbosch University	University of Pretoria	University of Free State	University of Cape Town	University of KwaZulu Natal
	University of the Western Cape	University of the Witwatersrand	Medunsa	Other (please specify)	

5	Do you hold a postgraduate qualification in the field of hand therapy? (Please tick the appropriate box)				**YES**	**NO**
	If YES, tick the appropriate box below					
	Post graduate Diploma in hand therapy	Master's degree in hand therapy	Certified Hand Therapist (CHT)	British Association of Hand Therapy (BAHT) Level 3	Other (please specify)	

6	Do you hold any other postgraduate qualification? (please specify below)

7	Indicate the diagnostic groupings that make up your typical case load. For the diagnostic groups chosen, indicate the **estimated percentage** it takes up in your practice setting. (Tick the appropriate boxes)												
	Tendon injuries			**Fractures**			**Cumulative trauma**			**Burns**			Other (please specify)
	<25	±50	>75	<25	±50	>75	<25	±50	>75	<25	±50	>75	
	Nerve injuries			**Brachial plexus injuries**			**Rheumatoid and/or Osteo Arthritis**			**Medico legal cases**			
	<25	±50	>75	<25	±50	>75	<25	±50	>75	<25	50	>75	

Participant code:

SECTION 2 **SECTION 3**

TEST		FREQUENCY OF USE Tick the relevant box with 'X' KEY:					IF FREQUENCY 1, 2 or 3, PLEASE STATE REASON FOR INFREQUENT USE BY TICKING RELEVANT BOX with 'X'						
		Not used at all				1	Not available in area	No training in use of tool	Monetary constraints	Time constraints	Not applicable	Not familiar	OTHER please specify
		Seldom				2							
		Sometimes				3							
		Frequently				4							
		Very Frequently				5							
1	Barthel index	1	2	3	4	5							
2	COPM	1	2	3	4	5							
3	DASH	1	2	3	4	5							
4	Dynamometer (Total and pinch grip)	1	2	3	4	5							
5	Finkelstein test	1	2	3	4	5							
6	Goniometry (ROM measurement)	1	2	3	4	5							
7	Grind test for OA of the thumb	1	2	3	4	5							
8	Grooved peg board	1	2	3	4	5							
9	HAT	1	2	3	4	5							
10	ICF	1	2	3	4	5							
11	Jebsen test of Hand function	1	2	3	4	5							
12	Kapandji's Rule of 10	1	2	3	4	5							
13	Manual muscle testing	1	2	3	4	5							

		Not used at all				1	Not available in area	No training in use of tool	Monetary constraints	Time constraints	Not applicable	Not familiar	OTHER please specify
		Seldom				2							
		Sometimes				3							
		Frequently				4							
		Very Frequently				5							
14	Michigan Hand Questionnaire	1	2	3	4	5							
15	Moberg pick up test	1	2	3	4	5							
16	Modapts	1	2	3	4	5							
17	Nine hole peg test	1	2	3	4	5							
18	Oedema measurement: Figure of 8	1	2	3	4	5							
19	Oedema measurement: Landmark	1	2	3	4	5							
20	Oedema measurement: Volumeter	1	2	3	4	5							
21	Phalen test	1	2	3	4	5							
22	Pin prick test	1	2	3	4	5							
23	Purdue Pegboard Test	1	2	3	4	5							
24	Semmes Weinstein monofilaments	1	2	3	4	5							
25	SF12 physical score	1	2	3	4	5							
26	Short form 36	1	2	3	4	5							
27	Smith Hand function evaluation	1	2	3	4	5							
28	Sollerman test of hand function	1	2	3	4	5							
29	STI Test	1	2	3	4	5							
30	Test for deep pressure	1	2	3	4	5							
31	Test for extrinsic tightness	1	2	3	4	5							

		Not used at all				1	Not available in area	No training in use of tool	Monetary constraints	Time constraints	Not applicable	Not familiar	OTHER please specify
		Seldom				2							
		Sometimes				3							
		Frequently				4							
		Very Frequently				5							
32	Test for FDS function	1	2	3	4	5							
33	Test for FDP function	1	2	3	4	5							
34	Test for intrinsic tightness	1	2	3	4	5							
35	Test for light touch	1	2	3	4	5							
36	Test for localization	1	2	3	4	5							
37	Test for OBR ligament tightness	1	2	3	4	5							
38	Test for proprioception	1	2	3	4	5							
39	Test for temperature	1	2	3	4	5							
40	Tinel' sign	1	2	3	4	5							
41	Two point discrimination test	1	2	3	4	5							
42	Valpar	1	2	3	4	5							
43	Vancouver scar rating scale	1	2	3	4	5							
44	Visual Analogue Pain scale	1	2	3	4	5							
45	Other	1	2	3	4	5							
46		1	2	3	4	5							
47		1	2	3	4	5							
48		1	2	3	4	5							

APPENDIX 2

Feedback from Pilot study participants

Questions posed to participants	Responses		
	OT I	OT II	OT III
Is the list of measurement tools inclusive of all possible tools?	Yes, mostly, contains many diagnostic tools that the doctor should be doing and not the OT. i.e. Phalen and Tinel	Yes, in addition to oedema measurements: figure of 8 and volumeter add the landmark test. Clarify the Jamar by rather calling it Dynamometry as there are other makes of the tool. Specify Range of motion testing by adding goniometry.	Yes, apart from the Valpar tests and Modapts that can be used to assess writing ability.
The frequency with which occupational therapists use the measurement tools in the assessment of the upper limb is being tested in the questionnaire	Yes	Yes	Yes
An option about alternative measurement tools used is asked in the questionnaire ('other' with space for text)	Yes	Yes	Yes
The list of factors impacting on the frequency of use of the measurement tools is representative of all possible reasons that may be put forward	Yes	Yes	Yes
An option about alternative factors impacting on the frequency of use of tools is asked in the questionnaire ('other' with space for text)	Yes	Yes	Yes
The clinical utility, e.g. how long does it take to complete	About 15 minutes	About 15 minutes	About 10 minutes
Face validity, i.e. are questions clear, is the correct terminology use, are the instruction for completion clear	Instructions are mostly clear, the legend should be at the top of every page, number the list of tests.	Yes, change the University of the Orange Free State to the University of the Free State.	Yes, very
Did a repeat of the questionnaire yield the same results?	Yes	Yes	Yes

APPENDIX 3

PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM

TITLE OF THE RESEARCH PROJECT:

Occupational therapy assessment of the upper limb: Trends in South Africa

REFERENCE NUMBER: S13/02/029

PRINCIPAL INVESTIGATOR: Susan de Klerk

ADDRESS: **Division of Occupational Therapy**
Department of Interdisciplinary Health Sciences
Faculty of Medicine and Health Sciences
Francie van Zijl Drive
Tygerberg

CONTACT NUMBER: 021 938 9291 / 0834313683

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

This study has been approved by the **Health Research Ethics Committee at Stellenbosch University** and will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, South African Guidelines for Good Clinical Practice and the Medical Research Council (MRC) Ethical Guidelines for Research.

What is this research study all about?

The aim of the research study is to provide an updated account of the use of occupational therapy measurement tools in the assessment of the upper limb. I will be gathering information about the frequency with which measurement tools are used in the assessment of the upper limb, by conducting a survey. If you choose to take part in this research you will be required to complete the survey. The survey has three sections. The first is demographic

information, the second is a list of measurement tools that can be used in the assessment of the upper limb, for you to indicate the frequency with which it is used and the third are the factors that might impact on your selection of the measurement tool. The survey will be given to occupational therapist attending South African Society of Hand Therapy courses in the Western Cape, KwaZulu-Natal and Gauteng. It will also be given to the class of 2013 intake of Post Graduate Diploma in Hand therapy students at the University of Pretoria. Therapist attending Occupational therapy in Occupational Health workshops in the Western Cape will also be approached. Contact might be made with individual therapist at main centers in South Africa if they are not represented in the groups discussed above. At venues not in the Western Cape, I will make use of colleagues to present the research study and the survey to potential participant. In the Western Cape I will undertake this role myself.

Confidentiality will be maintain when completing the survey but assigning you a participant code.

No information given as part of the survey will be used to your disadvantage.

Why have you been invited to participate?

You have been invited to participate as you are an occupational therapist, required to carry out assessment of clients with upper limb conditions.

What will your responsibilities be?

You will be required to complete the survey and to hand the completed survey to the study staff at your particular venue.

Will you benefit from taking part in this research?

You will not benefit directly from taking part in this research. The findings of this study could inform practice and education at an undergraduate and post graduate level in the field of hand therapy, which will benefit future clients.

Are there any risks involved in your taking part in this research?

There are no risks involved in taking part in the research.

Will you be paid to take part in this study and are there any costs involved?

No you will not be paid to take part in the study. There will be no costs involved for you, if you do take part.

Declaration by participant

By signing below, I ……..……. agree to take part in a research study entitled *(insert title of study)*.

I declare that:

- I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.
- I have had a chance to ask questions and all my questions have been adequately answered.
- I understand that taking part in this study is **voluntary** and I have not been pressurised to take part.
- I may choose to leave the study at any time and will not be penalised or prejudiced in any way.
- I may be asked to leave the study before it has finished, if the study doctor or researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) .....…..…….. on (*date*) ……....…….. 2013.

.....	.....
Signature of participant	**Signature of witness**

Declaration by investigator

I *(name)* ……..…… declare that:

- I explained the information in this document to ……..
- I encouraged him/her to ask questions and took adequate time to answer them.
- I am satisfied that he/she adequately understands all aspects of the research, as discussed above
- I did not use an interpreter.

(Signed at (*place*) .....…..…….. on (*date*) ……...…….. 2013.

.....	.....
Signature of investigator	**Signature of witness**

APPENDIX 4

Additional reasons offered for not using measurement tools

Measurement tool	Reasons offered for not using measurement tool
DASH	Not applicable to large percentage of my patients
Dynamometer (Total and pinch grip)	Informal testing also used
Finkelstein test	Depends on how often diagnosis seen
Grind test for OA of the thumb	I do not believe that it is a good test, there are others Don't see many OA thumb Depends on how often diagnosis seen Doctor does it
ICF	Should probably use more
Jebsen test of Hand function	Not available - use Work Well and other tests
Kapandji's Rule of 10	Used informally
Manual muscle testing	Old fashioned test. there are better ones
Modapts	Only consider it in work assessment
Oedema measurement: Figure of 8	Not my favourite approach Use other test Not preferred method Not necessary Only with severe oedema
Oedema measurement: Landmark	Volumeter more reliable Use other test Not preferred method Use figure of 8 more Prefer fig of 8
Oedema measurement: Volumeter	Use other test Sometimes no water at work
Phalen test	Not so many nerve injuries
Pin prick test	Do not prefer Don't like working with pins Not preferred method With full assessment use monofilaments
Semmes Weinstein monofilaments	Was not familiar with its use, used it once before
SF12 physical score	Not appropriate for low education Afrikaans patients
Short form 36	Not appropriate for low education Afrikaans patients

Smith Hand function evaluation	Outdated Too old
Test for deep pressure	Rather use monofilaments
Test for extrinsic tightness	Used when appropriate Depends on diagnosis
Test for FDS function	Only been exposed to clinics where resources are limited
Test for light touch	Only assessed when necessary to, once every 2 weeks Rather use monofilaments
Test for localization	Only assessed when necessary to, once every 2 weeks When required Done if problem is identified Rather use monofilaments
Test for OBR ligament tightness	Tend to forget to test for it Depends on diagnosis
Test for proprioception	Only when necessary if patient complains As necessary Only if necessary
Test for temperature	Only when necessary if patient complaint Rather use monofilaments
Tinel' sign	Don't see a lot of nerve injury's Once a month with slow nerve growth
Two point discrimination test	Personal preference I prefer monofilaments to test localisation, 2 pt discrimination does not give good info Not very reliable Only when necessary
Vancouver scar rating scale	Hardly see burns patients with scars in work assessment unit I don't have that many burns patients Done by Psychologist in unit Cannot remember it, scales confuse me
Visual Analogue Pain scale	Used by medico legal team Done by Psychologist in unit Patients often do not understand instructions even when explained numerous times